

# 2021

## ANNUAL REPORT

Aquatic Foods for  
Healthy People and Planet





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## WorldFish: An overview

### Who are we

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

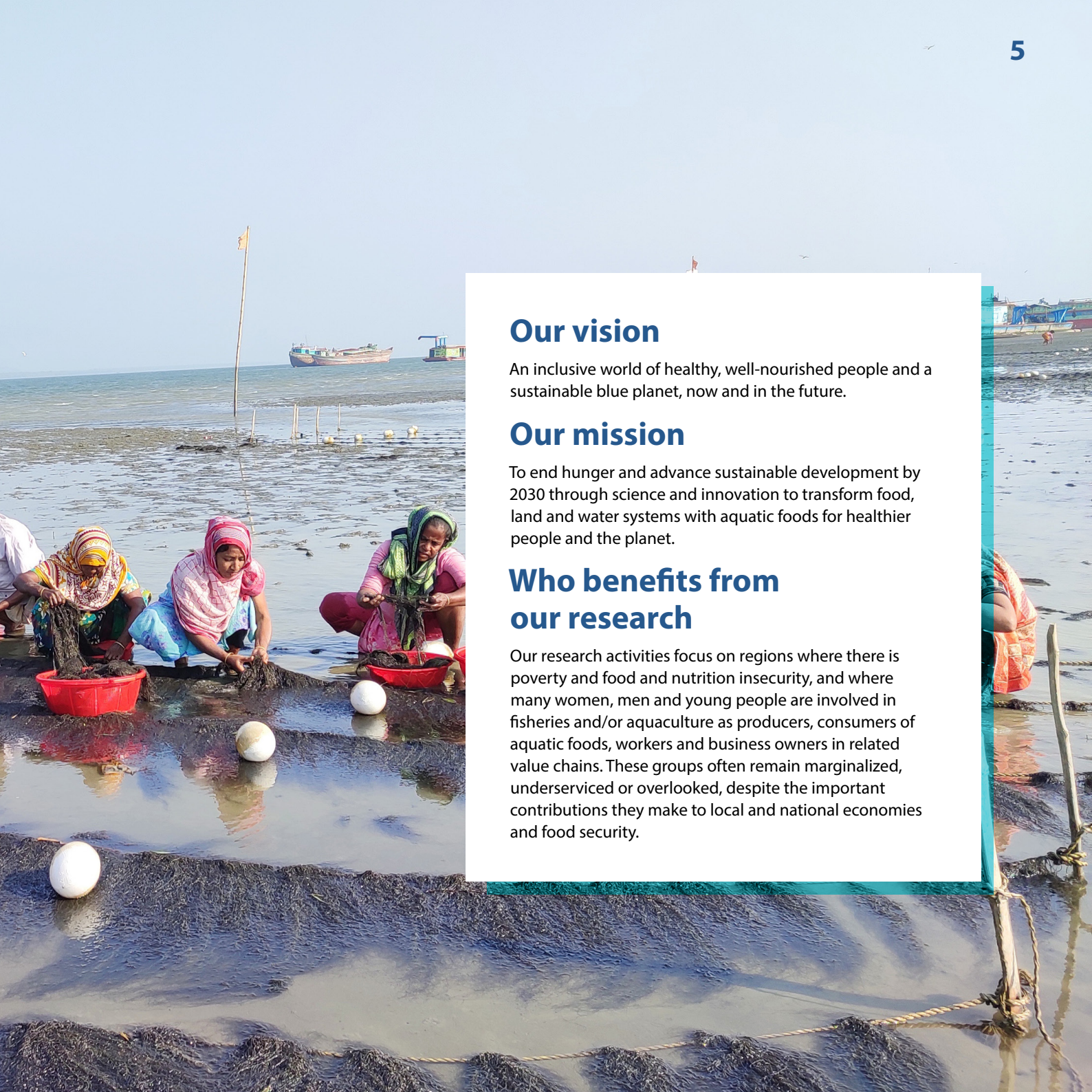
With a global presence across 20 countries in Asia, Africa and the Pacific, WorldFish has established itself as a global leader in research and innovation in sustainable aquaculture and fisheries. Since 1975, our work has enhanced the lives of millions of low- and middle-income people who depend on aquatic food systems for food, nutrition and livelihoods.

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

Our work is supported by a diverse network of funders and investors. Our diverse teams of science experts and professionals are deployed to work in regions across the world 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 and 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.



## Big facts on aquatic foods 2021



**800 million**  
people around the world depend  
on aquatic food systems for  
their livelihoods



**50%**  
of the global fish catch comes  
from capture fisheries, 90%  
of which from small-scale fisheries



**204 million**  
metric tons of fish production is  
projected by 2030



**1 in every 2**  
workers in the primary and secondary  
sectors of fisheries and aquaculture are  
women, who are crucial to aquatic food  
systems, providing labor, innovative ideas  
and entrepreneurship



**3.3 billion**  
people obtain 20% of their animal protein  
from consuming aquatic foods



**\$70 million**  
is the estimated market size of plant- and  
cell-based aquatic foods by 2030



**\$164 billion**  
is the global export value of fish in 2018,  
making aquatic foods among the world's top  
traded commodities



**66%**  
of fishstocks are currently within biologically  
sustainable levels, compared to 90% in 1990





**35%**

of the global catch from capture fisheries and aquaculture is lost or wasted



**\$22.5 billion**

is the annual loss of discarded fish



**40%**

is the estimated decline in tropical fish catch globally by 2050, unless actions are taken to reduce greenhouse gas emissions



**17%**

of all animal protein consumed globally comes from fish



**2 billion**

people are suffering from different forms of malnutrition who can benefit from the life-changing option of consuming nutrient-rich aquatic foods



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



**The weight of ocean plastics will exceed the weight of all fish by 2050,** unless coordinated multi-stakeholder actions to mitigate plastic pollution are taken



## Foreword

We are pleased to present the WorldFish 2021 Annual Report. In the pages that follow, we update you on the progress we have made in implementing our work plan for the year and delivering our organizational mission and vision. We also present key highlights from our country level achievements and the steps we took to expand our global outreach during the past year, despite the enormous COVID-19 related challenges.

The COVID-19 pandemic has thrown the world into disarray. The pandemic is three shocks in one: a public health crisis, a hammer-blow to the livelihoods of people living in poverty and a stress test for the global food system. The unprecedented health and economic crises brought on by the pandemic and the ensuing lockdowns led to an increase in poverty worldwide and precipitated a looming food crisis. The food system has been seriously disrupted, with reverberations experienced across global supply chains.

Working closely with the public and private sectors, we are developing innovations to mitigate the effects of COVID-19 on the nutrition, health and incomes of the most vulnerable. For example, WorldFish conducted a study in Myanmar, following up on a 2020 study with 143 fish supply chain actors, to assess the impacts of COVID-19 on the availability and price of aquatic foods and production inputs. The study found evidence suggesting women's ability to work may have been negatively affected by the pandemic.

A global shock of this magnitude puts a premium on international cooperation. It is therefore important that investments need to flow towards enhancing sustainable and equitable aquatic food production systems that deliver nutritional benefits to those who need it most.

One highlight of the year was Shakuntala Haraksingh Thilsted, WorldFish's Global Lead for Nutrition and Public Health, receiving the 2021 World Food Prize for her influential work on nutrition, fish and aquatic food systems. The World Food Prize is the most prestigious international award given to exceptional individuals who advance human development by improving the quality, quantity and accessibility of food for all. Thilsted is the first woman of Asian heritage to be awarded the "Nobel Prize for Food and Agriculture".

At the COP26 UN climate change conference, WorldFish scientists made waves by highlighting the important links between climate, health and nutrition, with aquatic foods delivering a triple win for people, planet and climate. Our scientists underscored the vital importance of climate change mitigation and resilient food systems solutions that are people-centric and that look beyond production.

In 2021, the flagship CGIAR Research Program on Fisheries Agri-Food Systems (FISH) concluded after four impactful years. FISH created evidence to improve food security, fight poverty, enhance sustainability, increase resilience to climate change and develop a new research base for fish agri-food systems. Spanning 20 countries in Africa, Asia and the Pacific, the program developed more than 150 innovations that will affect the lives of millions of small-scale farmers and fishers in the years to come.



In Bangladesh, WorldFish continued dissemination of the genetically improved Generation 3 (G3) rohu, part of the carp family of fish. The main impact of G3 rohu will be the increased sales of spawn from multiplier hatcheries. By the end of 2021, G3 rohu had been distributed to over 1500 enterprises, including hatcheries, nurseries and grow-out farms.

To improve the management of community fish refuge sites, WorldFish supported a 10 year USAID-funded initiative in Cambodia that concluded in 2021. Consequently, fish production of households around the country's Tonle Sap Lake has increased by 71%.

In Malawi, WorldFish developed a technology to dry fish that uses briquettes—compact blocks of organic waste for burning on a stove or fire—made from agricultural leftovers such as rice husks and groundnut shells. Using rice husks for briquettes is healthier, more cost-efficient and reduces deforestation that results from the use of firewood.

A new hatchery in Timor-Leste launched by WorldFish is now expected to produce more than 1 million fingerlings of Genetically Improved Farmed Tilapia (GIFT). These will be sold to fish farmers, nearby municipalities and non-government organizations. The hatchery is now a critical part of Timor-Leste's National Aquaculture Development Strategy (2012–2030).

WorldFish and partners supported over 2000 academicians, researchers and small-scale fishers from across Africa and the Middle East with online and offline training in 2021. Training topics included fish farming, feeding, nutrition, manufacturing, management and production for food security. These experiences underscore our role as a one-stop hub for expertise across the aquatic food sector.

The generosity of our funders, the continuous support of our esteemed partners and the incredible dedication of our staff made our accomplishments in 2021 possible. Their outstanding commitment to the advancement of research in inclusive global food security and sustainability has been recognized by the global scientific and development community.

We are delighted to present this report and we warmly invite you to learn more about our ongoing journey to transform food, land and water systems with aquatic foods.



**Baba Yusuf Abubakar**

Chair of the Board of Trustees



**Essam Yassin Mohammed**

Interim Director General &  
CGIAR Acting Senior Director  
of Aquatic Food Systems

## Big splashes 2021



407

partnerships

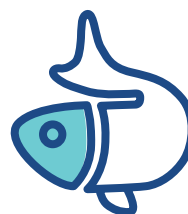
115

new partnerships in 2021



38

research innovations



28

active projects  
in 2021



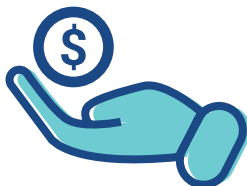
1,800,000+

reached via  
online events



462,863


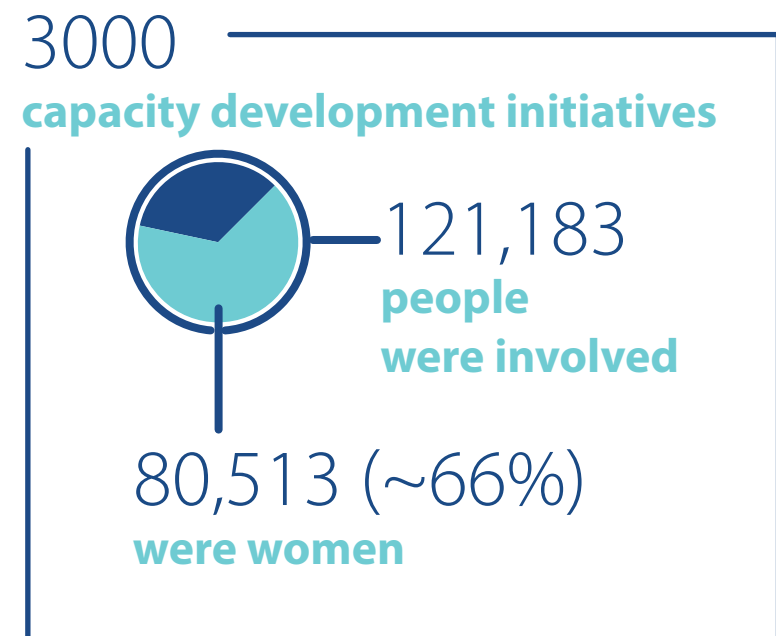
households have adopted improved fish  
breeds and/or aquaculture or fisheries  
management practices



776,306

people were assisted to exit poverty





691,349  
vulnerable women,  
children and men  
have increased fish  
consumption and/  
or dietary diversification  
because of aquaculture  
and small-scale  
fisheries interventions

An icon of a fish on a plate with steam rising from it, representing increased fish consumption.



416  
publications  
during 2021

128  
peer-reviewed  
journal articles

103  
open-access  
publications

6  
publications with  
an Altmetric score  
above 100

cutoff December 31, 2021

## 2021 highlights

### Reimagining food sustainability

#### Voice for aquatic foods at the 2021 UN Food Systems Summit

The annual Food Systems Summit assembles UN member states and their constituencies. These include thousands of youths, food producers, indigenous peoples and researchers, as well as representatives from the private sector and civil society organizations. Together, they bring about actions to transform the way the world produces, consumes and thinks about food.

This virtual event offers a dynamic platform for heads of state, government and other constituencies to take the food systems agenda forward.

WorldFish joined the 2021 Summit to highlight the essential role of aquatic food systems in sustainable healthy diets for all. WorldFish showcased its efforts in areas such as policy action, gender-equal accessibility to resources and strengthening our commitments to provide nutrition-sensitive aquatic food systems.



**Together, we must take the opportunity to build a global movement and co-design interventions that make aquatic foods an integral part of the food systems transformation agenda.**



**Gareth Johnstone**

*Director General*

*(term ended December 2021)*



WORLD  
FOOD PRIZE  
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## 2021 World Food Prize recipient

The World Food Prize, also known as the “Nobel Prize for Food and Agriculture,” is the most prestigious international award given to exceptional individuals who advance human development by improving the quality, quantity and accessibility of food for all.

Shakuntala Haraksingh Thilsted, WorldFish’s Global Lead for Nutrition and Public Health, was awarded the 2021 World Food Prize for her influential work on nutrition, fish and aquatic food systems.

Thilsted’s research demonstrated that high levels of multiple essential micronutrients and fatty acids in affordable and locally available foods offers life-changing benefits for children’s cognitive development in their first 1000 days of life and the nutrition and health of their mothers.

From this breakthrough, she developed nutrition-sensitive approaches and innovations to food production, distribution and consumption that have improved the diets, nutrition and livelihoods of millions of vulnerable women, men and children living in low- and middle-income countries across Asia, Africa and the Pacific.

Thilsted is the first woman of Asian heritage to be awarded the World Food Prize.



## Arrell Global Food Innovation Award

Shakuntala Haraksingh Thilsted was also named the recipient of the 2021 Arrell Global Food Innovation Award for pioneering nutrition-sensitive approaches to aquatic food systems in both fisheries and aquaculture. These approaches honor local, culturally appropriate solutions to improve the nutrition, health and development of children and mothers across Asia, Africa and the Pacific.

Thilsted is the first to identify the nutritional value of small fish species such as mola and *Trey Changwa Plieng* that are native to Bangladesh and Cambodia respectively. This breakthrough showed that these readily available small fish are rich in micronutrients and essential fatty acids that offer life-changing benefits for children's cognitive development and the health of their mothers.

The Arrell Food Institute award program recognizes Thilsted as a mentor to many scientists and activists. It also acknowledged her efforts to advocate for better food and nutrition security solutions on the global stage.

//

**This award acknowledges the unmatched potential of diverse aquatic foods in food system research, policies and interventions, at national, regional and global levels. Aquatic foods offer life-changing opportunities for millions of vulnerable women, children and men to be well-nourished and healthy.**

//

**Shakuntala Haraksingh Thilsted**

*Global Lead for Nutrition and Public Health*

## The environmental promise

### Waves at COP26

COP26, the 2021 United Nations Climate Change Conference, concluded with a new global climate agreement. Nations reaffirmed pledges to hold global warming to 1.5 degrees Celsius above pre-industrial levels, the number set in the 2015 Paris Accords.

At COP26, WorldFish highlighted the links between climate, health and nutrition, with aquatic foods as a nature-positive solution for all. WorldFish scientists focused on the importance of climate change mitigation and resilient food systems solutions that are people-centric and must look beyond production.



**Ensuring access to climate information and enhancing climate services can promote women and youths' involvement in daily management decisions and strengthen their abilities to adapt to and offset climate impacts.**



**Peerzadi Rumana Hossain**

*Climate Change Research Scientist*

## In pursuit of lasting food security

### FISH program concludes after four years

In 2021, the CGIAR Research Program on Fish Agri-Food Systems (FISH) concluded after four years. The program created evidence to improve food security, fight poverty, enhance sustainability, increase resilience to climate change and develop a new research base for fish agri-food systems.

The program developed around 150 innovations that have reached small-scale farmers and fishers. The impact of these innovations will reach millions of people worldwide.

FISH led the publication of 310 peer-reviewed Institute for Scientific Information journal articles. These public goods provide new evidence on the role of fish and other aquatic foods in improving food and nutrition security, reducing poverty and enhancing environmental sustainability. Around 70% of these were open access.

//

**It's completely thanks to an amazing team of committed researchers, supporters and partners that we can now stand back and see some successes—from challenges to global structures and norms that have held back progress on the Sustainable Development Goals, to the introduction of new field-born and tested innovations into the pathways toward more sustainable and equitable futures.**

//

**Philippa Cohen**

*Research Leader for the Small-Scale Fisheries Research Program*







## New approaches to promote sustainable and equitable aquatic food systems

Cross-sector collaborations are at the heart of scientific discovery. Our partnerships range from global-level decision-making to national, subnational and household levels.

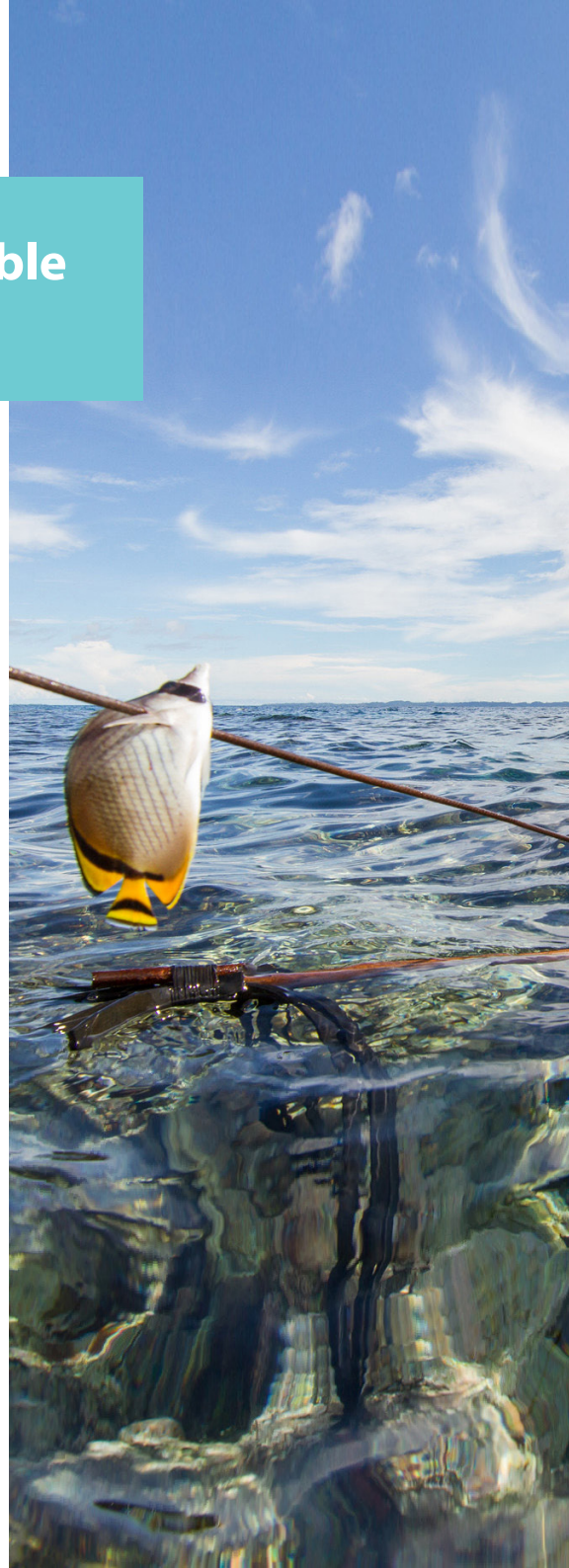
### Support for the global panel on aquaculture

Aquaculture is the world's fastest-growing food production sector. In February, leading international policy experts, with contributions from WorldFish, urged decision-makers to focus on aquaculture for a sustainable food system transformation. The Global Panel on Agriculture and Food Systems for Nutrition (GLOPAN) launched the 'Harnessing aquaculture for healthy diets' policy brief to guide international decision-making related to the expansion of aquaculture.

### Gender-transformative approaches

Gender-transformative approaches (GTAs) complement and go beyond traditional gender approaches and can contribute to more potent and longer-term gender outcomes. While traditional approaches work around existing gender barriers, GTAs shift underlying social norms that perpetuate inequalities.

The innovation package on GTAs can help reshape the way that gender issues are approached in aquatic food systems. WorldFish piloted projects in the Barotse Floodplain of Zambia and the Barisal region of South-West Bangladesh, where short-term fixes to gender issues were being replaced by a shift to addressing underlying gender barriers.



## Better management practices in aquaculture

Better management practices (BMPs) are an integrated way to optimize the benefits of improved genetics in sustainable aquaculture intensification. The BMPs cover fish nutrition and feeding regimes, genetics and breeding programs, fish health management, farming systems, pond management, water quality management and gender integration.

They are now widely available in multiple languages in Asia, Africa and the Pacific, through dissemination from public and private partners. They contribute to small farmers' incomes by increasing productivity and efficient use of inputs, thus reducing negative environmental impacts.

## Pioneering genetic improvement innovations in carp and tilapia (GIFT)

Pioneering genetic improvement innovations in carp and tilapia (GIFT) have achieved gains anywhere from 8% and higher and have helped aquaculture to now provide half of the global fish supply. Selective breeders in the terrestrial agricultural realm are happy with gains of a few percentage points per generation. GIFT is now in its 17th generation and growing 100% faster than it did before the breeding program started. Faster-growing, hardier and more disease-resistant fish will allow farmers a greater return on their investment and in some countries will lead to lower prices for consumers.



**The interaction that WorldFish is having with our farmers is really having great value that will change the sector because there is really enough that I am seeing coming on the table in efforts to improve the aquaculture sector.**



**Makozo Chikote**

*MP, Minister of Fisheries and Livestock, Republic of Zambia*





## Nutrition-sensitive approaches to food systems transformation

Fish and aquatic foods contribute a wide range of micronutrients that are essential to human health. The nutritional benefits of fish are being well documented through our set of nutrition-sensitive approaches to food system transformation for food production and processing, with an emphasis on the food, nutrition security and health and well-being of vulnerable children and women. This included expanding the production of small indigenous fish species, increasing productivity and reducing waste and loss in fish value chains and developing improved feeds to enhance the nutritional value of fish.

## Digital tools for efficient decision-making and investment

Digital tools and innovations can help record fishing activities, improve access to aquaculture finance and markets, improve the efficiency of management and conservation planning and identify fish pathogens. A suite of digital tools and approaches for aquaculture and small-scale fisheries that improve management and policy decisions across food systems were produced, which includes a variety of tools that are increasingly being put into use to inform and connect farmers and other supply chain actors, as well as advise government entities in real time for decision-making.

PeskaAAS, a low-cost digital catch monitoring and automated analytics system developed by WorldFish, has enhanced the availability of almost real-time data to fishers and fisheries managers to support management decisions. Timor-Leste has fully integrated PeskaAAS into its national fisheries management after successful pilots.

Agvisely, a web-based system that converts meteorological data into a decision-making tool for fish farmers to lower associated climate risks has helped an estimated 100,000 fish farmers in Bangladesh. This climate information system has since been scaled to the Indian state of Odisha, where a mobile phone advisory system now incorporates climatic advisories, as well as Zambia and the Southern African Development Community.



**Being a Suchana consortium member, WorldFish has successfully contributed to promoting pro-poor nutrition-sensitive aquaculture among poor and very poor households in the first 1000 days of life to reduce chronic undernutrition among children under 2 years old.**



**Shahed Rahman**  
*Chief of Party, Suchana Program, Save the Children*



**Co-creation of climate-smart aquaculture technologies jointly framed by WorldFish DOF-CNRS helped gain nutritional and financial benefits of the vulnerable poor households in the flood-prone haor basin of Bangladesh.**



**Mokhlesur Rahman**  
*Executive Director, CNRS*

## Rice-fish production practices for combining productivity and nutritional outcomes

Rice-fish production practices were first used 2000 years ago to bring fish back into the rice fields. They can be integrated using a variety of innovations that can make efficient use of increasingly scarce water and land. The innovations not only address environmental and nutrition concerns but can maintain rice productivity and almost double the profitability of the landscape. Innovations combine productivity and nutritional outcomes while building resilience and enhancing biodiversity.

Thousands of Cambodian farmers, who adopted the improved rice-fish systems, saw gains of 60 percent and 27 percent in income and fish consumption, respectively. This integrated production system has opened a new frontier for climate-resilient aquatic food production in Cambodia and Myanmar.

## A new generation of fisheries co-management approaches

Fisheries co-management is becoming more widely adopted globally for the management of small-scale fisheries. Resource user groups, such as local fishers and other entities, such as government agencies or non-governmental organizations, share management responsibilities and authority, set the rules and make future management decisions that help improve the legitimacy of fisheries regulations at the local scale through more inclusive, transparent and mutual decision-making processes and through stewardship of natural resources, local economic development and governance activities.

WorldFish's methodological, technological and governance innovations, such as handbooks for gender equity and social inclusion, fish aggregating devices and compensation schemes for fisheries closures, contributed to greater gender equity, nutrition and social-ecological gains in addition to the social, economic and environmental benefits of fisheries co-management.



**The outcomes achieved across science, policy and communities in this single ACIAR investment is truly impressive. Strategies to engage decision-makers and building evidence for change are exemplary examples of knowledge brokering, informed by the political, institutional and socio-cultural contexts.**



**Ann Fleming**

*Fisheries Research Program Manager, ACIAR*

## Scientists shaping agendas

### Bangladesh

#### Benoy Kumar Barman Senior Scientist

Benoy Kumar Barman works tirelessly to support projects in Bangladesh, such as scaling systems for improved tilapia strains, supporting work on the genetically improved G3 rohu, working on small indigenous species for improved nutrition, advancing climate-smart and nutrition-sensitive fish production technologies and supporting a pilot project on culturing Artemia.

Barman also advanced South-South cooperation by supporting the carp-mola indigenous small fish species (SIS) polyculture project in Assam, India and the AfricaRice integrated rice-fish farming project to improve food security and nutrition in Liberia.

### Egypt

#### Ahmed Nasr-Allah, Egypt Country Director

In Egypt, Ahmed Nasr-Allah pioneered research and innovation in order to generate impact on sustainable development of the country's fisheries sector. With Nasr-Allah's contributions, WorldFish took the lead in the development of climate-smart aquaculture with the establishment of two demonstration units containing 3 cells each.

Through a partnership with FAO and the Egyptian government, WorldFish developed the National Aquatic Animal Health Strategy for the sustainability of Egypt's aquaculture sector. Under Nasr-Allah's leadership, capacity-building initiatives were scaled across Egypt and elsewhere in Africa in partnership with development partners and the national fisheries authority. Nasr-Allah helped facilitate 24 trainings, both physical and virtual, for 2,042 people, of which a third were women.

### Cambodia

#### Sarah Freed, Scientist

Sarah Freed is an applied scientist working to improve human and ecosystem wellbeing. Her current work for Cambodia and the greater Mekong region focuses on fish in agroecosystems, community empowerment and equity in fisheries and agriculture and the transformation of food systems to support biodiversity, nutrition and climate change adaptation.

Freed's work has contributed significantly to the improvement of economic benefits and the integration of nutrition and gender aspects in rice field fisheries for close to 100,000 rural households.

### India

#### Neetha Shenoy, Aquaculture Specialist

Neetha Shenoy leads the MEL and GESI aspects of WorldFish's programs in India working with partner organizations to design field surveys, collect, collate and analyze data, as well as prepare technical reports. Shenoy works with the APART project with the government of Assam, the GIZ-funded Scaling nutrition-sensitive SIS project and the USAID-funded project on Scaling nutrition-sensitive fisheries technologies in Odisha.

Shenoy collaborates with the Fisheries and Animal Resources Development Department in the state of Odisha in promoting a flagship government initiative — fish farming in village tanks by more than 10,000 Women Self-Help Groups engaging over 100,000 households.



## Malawi

### Alinafe Maluwa, Research Assistant, Sustainable Aquaculture

Alinafe Maluwa supports the deployment of extension support services to create inclusive business and entrepreneurial models (IBEMS) among smallholder farmers and supply chain actors in Malawi. Capitalizing on the IBEMS innovation, WorldFish will continue to promote the adoption of better-quality fingerlings/seed and feed as well as improved management practices in its effort to grow aquaculture as a business in Malawi.

Through Maluwa's efforts, 582 farmers were trained in better management practices for aquaculture, nearly four out of ten of those being women. Maluwa also trained 18 IBEMS to produce quality seeds to sell to other farmers. From producing no quality seed at all, in the first production season, the IBEMS produced 434,171 fingerlings, of which 63,500 were monosex.

## Nigeria

### Bernadette Fregene, TAAT Compact Leader

Bernadette Fregene leads the capacity building program in Nigeria under the Technologies for African Agricultural Transformation (TAAT) project to disseminate proven aquaculture technologies. The program benefitted 31,951 individuals in 12 African countries by accessing and effectively using aquaculture technology products and services.

## Solomon Islands

### Janet Saeni-Oeta, Senior Research Analyst

Janet Saeni-Oeta plays an important role in shaping the research and partnership agenda with the provincial fisheries officers in Solomon Islands, who provide extension services to communities.

Saeni-Oeta has worked as a key partner within that team to evaluate management planning with the respective communities. This has led to improved inclusive practices for providing technical advice and support for communities seeking to sustainably manage their coastal resources.

## Zambia

### Mary Lundeba, Scientist, Sustainable Aquaculture

Mary Lundeba is a versatile scientist who has played a pivotal role in building the capacity of smallholder farmers in northern Zambia in multiple disciplines, including best aquaculture practices and nutrition-sensitive fish food systems.

Lundeba helps transform the mindset of smallholder farmers, from depending on aquaculture as livelihood to practicing aquaculture as an enterprise and also supports mentoring and coaching research assistants and emerging scientists in northern Zambia.

## From research to impact

### Shaping agri-food systems with aquatic foods

The fish agri-food system connects supplies of aquatic foods to consumers across the planet. Launched in 2017, the CGIAR Research Program on Fish Agri-Food Systems (FISH) was a 5-year program that provided evidence of the role of aquatic food in improving food and nutrition security, reducing poverty and enhancing environmental sustainability.

FISH research spanned 20 countries in Africa, Asia and the Pacific. It focused in-depth on Egypt, Nigeria, Zambia, Bangladesh, Cambodia, Myanmar and Solomon Islands.



The program championed the increased role that fish and other aquatic foods must play in securing sustainable, healthy and resilient food systems.



FISH helped position small-scale fishers, fish farmers and value chain actors, their well-being and their services as central to food system transformation.





25



**462,863**

households have adopted improved fish breeds and/or aquaculture or fisheries management practices



**776,306**

people were assisted to exit poverty



**691,349**

vulnerable women, children and men have increased fish consumption and/or dietary diversification because of aquaculture and small-scale fisheries interventions



**350,510**

hectares of water were brought under improved fisheries co-management and aquaculture management



**71**

peer-reviewed publications, of which 68 were indexed by the Institute for Scientific Information (ISI), including journal articles, books and book chapters



**51**

policy and technical briefs and knowledge products disseminated widely, in multiple languages, with data products made available in open access formats



## Country highlights

### Bangladesh

#### Integrating salt and Artemia production

In Bangladesh, roughly half a million people are involved in salt production in the country's southern district of Cox's Bazar. However, the industry and its workforce face major challenges such as low profitability, high unemployment during the rainy season, increased land costs and low aquaculture productivity.

A new integrated salt-Artemia-aquaculture technology brings great potential. Artemia brine shrimp are the world's most widely used live-food item for the larviculture of crustaceans and marine fish. Artemia is cultured in highly saline water, offering major opportunities for salt farmers to integrate Artemia, fish and shrimp production into their salt farms.

Initial assessments showed that the country's salt/aquaculture farmers were unaware of Artemia farming and its potential for shrimp and fish production on their salt farms. WorldFish and partners have introduced an integrated salt and Artemia production system into the salt farms of Cox's Bazar. The project draws inspiration from similar successful projects in Thailand and Vietnam. This new technology will improve the socioeconomic conditions of salt farmers and also reduce the country's dependence on imported Artemia.

//

**The Artemia for Bangladesh project by WorldFish is a potential program for the improvement of the community in Cox's Bazar and other coastal areas of Bangladesh. If they can reach marginal people and make them understand the culturing process and benefits, this may have a very positive impact. As far I am concerned about this project, team Artemia is giving their best. I wish them success.**

//

**Md. Zafor Iqbal Bhuian**

*Deputy General Manager, Salt Industry Development Office, Bangladesh Small and Cottage Industries Corporation*

//

**Artemia production in the salt farms is a great climate-smart initiative to improve coastal aquaculture in Bangladesh.**

//

**Shahidul Alam Chowdhury**

*Joint Secretary General, Shrimp Hatchery Association of Bangladesh*

//

**The WorldFish implemented Feed the Future Bangladesh Aquaculture and Nutrition Activity provided support to establish an Uber-type fish transportation businesses in Bangladesh. Thanks to support from the aquaculture activity, our business has grown into a commercially viable and socially beneficial venture in the aquaculture sector.**

//

**Fatema Zannat**

*Managing Director, M-World*

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**Our collaboration with WorldFish taught us various scientific methodologies, eye-opening experimental observations and management of two economically viable projects on aquatic disease diagnosis lab and promotion of PG (Pituitary Gland) with the support of Feed the Future Bangladesh Aquaculture and Nutrition Activity.**

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**Mohammed Tarique Sarker**

*Managing Director, FishTech Hatchery Ltd.*

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**We sincerely appreciate the technical support of WorldFish in Suchana program, which successfully engaged the poorest families in aquaculture achieving remarkable improvements in their nutritional status.**

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**Bazle Mustafa Razee**

*Executive Director, Friends In Village Development Bangladesh*

## Improved carp genetics

In 2020, WorldFish disseminated the genetically improved Generation 3 (G3) rohu strain for the first time in Bangladesh. Rohu is part of the carp family of fish and is an economically and culturally important fish in the country. WorldFish continued its dissemination in 2021 with an additional release to 23 nurseries and three multiplier hatcheries. The main impact of G3 rohu dissemination will be increased sales of spawn from multiplier hatcheries, beginning in 2022.

Improved carp seeds were then field tested with support of the Innovation Design and Entrepreneurship Academy project funded by the US government incubation program. The result was a 37% increase in the growth rate in ponds that are managed entirely by farmers.

By the end of 2021, the G3 rohu had diffused to more than 1500 enterprises, including hatcheries, nurseries and grow-out farms, primarily via partner nurseries.

**We have continued our strong collaborations with WorldFish using a One Health approach to better understand and manage the threats posed by AMR in aquaculture. Last year this included the successful development and implementation of an AMR wet market surveillance system in Bangladesh.**

**UK Cefas**

*(part of the UK FAO Reference Centre for Antimicrobial Resistance)*



**In partnership with WorldFish, the Akphivath Neary Khmer Organization (ANKO) receives a lot of knowledge for working with communities such as through committee capacity building by using a spider graph, community visioning map and a stakeholder analysis tool, which allows the CFR management committee to understand their capacity and prepare their future action plan.**

**Through knowledge of a Biological Monitoring Survey (BioM) and a Catch Consumption Employment Monitoring (CCEM) survey, we know types of fish, OAA and their abundance and water quality and fish caught by farmers. ANKO is using that knowledge and applying it to other donors.**



**Lov Samnan**

*Executive Director, ANKO*





**The International Centre for Climate Change and Development (ICCCAD) has had the pleasure to partner with WorldFish on several training programs on climate services for fisheries and aquaculture.**



**Saleemul Huq**  
ICCCAD



**Universal access to financial services is now within reach of many fish farmers—thanks to new technologies and transformative business models. WorldFish’s Feed the Future Bangladesh Aquaculture and Nutrition Activity’s support to increase investment in aquaculture sector has been a significant milestone for the banking sector in Bangladesh.**



**Sardar Akhter Hamid**  
Deputy Managing Director, Bank Asia



**USAID/Bangladesh is pleased to support Feed the Future Bangladesh Aquaculture and Nutrition Activity implemented by WorldFish. The Activity is producing anticipated results in terms of increased productivity, capacity building of aquaculture actors and upliftment of the nutritional status of ZOI aquaculture farmers. This initiative is contributing to ensuring food security in Bangladesh.**



**Mohammad Sayed Shibly**  
Project Management Specialist and AOR,  
Feed the Future Bangladesh Aquaculture  
and Nutrition Activity, Economic Growth  
Office, USAID Bangladesh

## Cambodia

### Improved fish refuges

Rice field fisheries—the fishing that occurs in and around flooded rice fields during the wet season from July to February—are a vital source of food and income for nearly all rural households in Cambodia. Fishing in flooded fields requires relatively little capital investment and land ownership. Yet these fisheries, which contribute 20%–25% of the country’s inland fish catch, are often poorly managed and have low productivity. Community fish refuges (CFRs) are natural or human-made ponds that hold water throughout the year and provide a dry season sanctuary for broodfish. These refuges can increase fish populations in rice field fishery areas.

WorldFish supported a 10-year CFR intervention funded by the United States Agency for International Development (USAID) that ended in 2021. Over 400 improvements were made at 140 refuge sites where dependence on rice field fisheries is greatest. Improved management of fish refuges has boosted fish production of households around the country’s Tonle Sap Lake by 71%.

In 2021, WorldFish shared the results of these interventions, including the nutrition and gender outcomes. The results also provided an example for a perspective paper on the effective integration of social aspects into technical investments for more inclusive benefits. Practitioner guides were also disseminated to enable the implementation of activities beyond the project period.



**GIZ is happy to support WorldFish with a grant agreement to strengthen community-based rice-field fisheries systems (CFRs) in Cambodia. The close, collaborative working relationship with local communities and government partners is ensuring lasting, sustainable impact and the improvement of livelihoods for local communities in Kampong Thom province.**



**Sean Austin**

*Project Team Leader, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH*



**Partnerships between My Village and WorldFish are good, it has contributed to achieve the MVi project goal and MVi strategy in fishery conservation and CFi sustainability.**



**My Village**

*Cambodian nongovernmental organization*

## Ecosystem approaches to community fisheries management

Workshops and community sessions enabled communities along the Mekong River and Tonle Sap Lake to incorporate ecosystem-based approaches into their fisheries management plans.

## Sustainable aquaculture development

WorldFish published a study using the most comprehensive data to date on Cambodia's aquaculture value chain. The study revealed the priority needs for encouraging sustainable aquaculture development and the complementarity between fisheries and aquaculture development in Cambodia.

## One CGIAR collaborations

In 2021, WorldFish collaborated with other CGIAR organizations to develop important research programs that support Cambodia's plans for sustainable food production in the face of climate change. One output from these collaborations includes a report on rice-fish pathways to sustainable development impact in Cambodia and the Lower Mekong. These efforts have led to three new initiatives in the Greater Mekong Region: Agro-Ecology; Asian Mega Deltas; and Resilient Aquatic Food Systems.



**USAID is proud to have supported both phases of the Rice Field Fisheries program spanning a decade. The work on governance and management for conservation and biodiversity of this precious resource—the Tonle Sap—contributed to improved livelihoods for the Cambodian people.**



**Rebecca Black**  
*Acting USAID/Cambodia Mission Director*



**Culture and Environment Preservation Association is an NGO that specializes in natural resource management, particularly on fishery resources management and its related biodiversity and ecosystem. CEPA, in partnership with WorldFish, has improved capacity and skills on fish ecology and EAFM to communities for effective fishery management.**



**CEPA**  
*Cambodian nongovernmental organization*



## Egypt

### Fostering national actions toward enhancing biosecurity governance

The office of the Food and Agriculture Organization (FAO) in Egypt has contracted WorldFish to become a main partner to the General Authority for Fish Resources Development (GAFRD) in developing the country's National Strategy on Aquatic Animal Health of Egypt (NSAAHEg).

The strategy has been initiated as a baseline for improving fish health practices in Egypt. Its objective is to enhance biosecurity governance and support sustainable aquaculture production in the country. This was done following FAO's principles in identifying progressive pathways for improving aquaculture biosecurity (PMP/AB) management and ensuring the involvement of multistakeholders at the national level.

### Accelerating smart solutions in aquaculture and fisheries

There is an urgent need to intensify fish production in the country's existing production areas in order to ensure food security. WorldFish signed a tripartite Memorandum of Understanding (MoU) with the General Authority for Fish Resources Development (GAFRD) and the U.S. Soybean Export Council (USSEC) to respond to the country's unmet needs. In addition to that, the MoU has paved the way for a national initiative for demonstrating two In-Pond Raceway Systems (IPRS) technologies in Barseeq and Khasha.





WorldFish has the experience in developing the IPRS culture system as a climate-smart aquaculture system and advancing green technology that depended on solar cells' clean energy in fish farming. This culture system use innovative solutions that increased yield, reduced water use and minimized the impact of fish farming on the environment.

## Capacity building of aquaculture researchers and small-scale fisheries across Africa and the Middle East and North Africa region

In partnership with the International Fund for Agricultural Development (IFAD), the USSEC and the United Soybean Board, WorldFish has empowered academics, researchers and small-scale fisheries through a series of 22 virtual training programs and two in-person training sessions.

More than 2000 participants from Ghana, Kenya, Mozambique and Ethiopia of the Africa region and Jordan, Iraq, Tunisia and Egypt of the Middle East and North Africa region have participated in different online and offline sessions on topics related to fish farming, feeding, nutrition, manufacturing, management and production for food security. Sharing good practices and exchanging innovative solutions, as well as mistakes to avoid based on lessons-learned, have always been vital outcomes and key outputs for these training, which intensify the WorldFish leadership's role as a one-stop hub for widely spreading multi-expertise across the aquaculture sector at both national and regional levels.



## India

### Cage culture in the inland open waterbodies of Odisha

Odisha offers an ideal environment for cage culture fish farming using parts of existing water resources such as reservoirs and lakes while fish are enclosed in a net cage.

There are 138 reservoirs in Odisha, with a mean water spread area of 140,000 ha. This accounts for approximately 25% of the total inland freshwater resources of the state and about 8% of the total reservoir resources of the country.

In 2018-2019, through technical collaboration with WorldFish and ICAR-Central Inland Fisheries Research Institute, Barrackpore, West Bengal, the Fisheries & Animal Resources Development (FARD) Department, the Government of Odisha installed two circular cages in the Hirakud reservoir in Sambalpur District. These cages were handed over to the local Primary Fishermen Co-operative Societies (PFCS) for fish farming operations and functional management of cages and Indian major carp such as rohu (*Labeo rohita*) were successfully grown.

The Odisha government also collaborated with WorldFish to conduct an extensive study on the status of cage culture in reservoirs and develop an action plan for promoting cage culture fisheries. Based on the findings of the study, in 2020, the Government of Odisha brought out policy guidelines for taking up cage culture in reservoirs in partnership with the PFCS. WorldFish also assisted the FARD Department to prepare zonation maps of reservoirs for leasing out the cage culture zones and sub-zones to the entrepreneurs.

Currently, the Hirakud Dam has investments from 69 small and medium entrepreneurs. The government will extend the Hirakud cage culture model to Indravati, Rengali, Balimela and many other reservoirs in the state.





## Fish-based nutrition for children, adolescent girls and nursing mothers under the government nourishment program

Food security, malnutrition and anemia are major concerns in the country's tribal districts of Odisha. The government nutrition program under the Integrated Child Development Services scheme supplies pregnant women and lactating mothers and adolescent girls with a nutritious take home ration (THR) including foods such as eggs and wheat-based dry rations. For children 3–6 years old, the scheme offers hot cooked meals in kindergartens on a daily basis.

WorldFish supported the Government of Odisha in 2020 to include fish-based nutrition under its 5-year Strategy for Odisha's Pathway to Accelerated Nutrition (SOPAN-2025). With funding support from USAID, WorldFish, in collaboration with the Odisha Government's Women and Child Development Department, piloted a six-month program under which 800 expecting and lactating mothers were provided with a hygienic solar-dried small fish THR and 1200 children were served hot cooked meals flavored with fish powder three times a week.

The pilot created awareness on the importance of diversified diets in the first 1000 days of life among pregnant women and lactating mothers at community level.



**Political will, blended with proactive bureaucracy and inter-departmental convergence, can help with grounding initiatives. Partnerships with WorldFish and ICAR are important as they provide technical inputs, supply and support. Finally, involving women is also critical for their livelihood and food security.**



**Anu Garg**

*Additional Chief Secretary, Water Resources Department,  
Government of Odisha, India*





## Myanmar

### Secured future for hilsa fisheries

The UK government's Darwin Initiative grant scheme protects biodiversity and the natural environment through locally based projects worldwide. The scheme has agreed to fund the Darwin-HilsaMM project, which developed a system of incentive-based fisheries management to guarantee the sustainability of Myanmar's hilsa fisheries.

In a consortium that includes the country's Department of Fisheries, WorldFish and partners developed a financially sustainable fisheries management system. By making a bold business case for action, WorldFish and partners have built political will for more sustainable management of Myanmar's artisanal hilsa fisheries. The Department of Fisheries has endorsed hilsa sanctuaries and a new closed season in accordance with the research results provided by WorldFish, the International Institute for Environment and Development and partners.

### Seeding the future

Small fish can provide a lot of nutritional power. The US-based Institute of Food Technologists awarded a USD250,000 grant to WorldFish in Myanmar and Zambia for proposing a nutrient-rich small fish production project. The Institute's Seeding the Future Global Food System Challenge supports multidisciplinary teams to create game-changing innovations that can transform the global food system.

WorldFish Myanmar and Zambia are grand prize winners of the challenge. Their project intends to produce dried, small fish powder for the preservation of nutrient-dense fish as a healthy and affordable option for consumers. WorldFish's innovative nutrition-sensitive approach stood out from nearly 900 proposals from start-ups, non-profits, universities and research institutions from more than 60 countries.



**The outcomes achieved across science, policy and communities in this single ACIAR investment is truly impressive. Strategies to engage decision-makers and building evidence for change are exemplary examples of knowledge brokering, informed by the political, institutional and socio-cultural contexts.**



**Ann Fleming**

*Fisheries Research Program Manager, ACIAR*

## Malawi

### Reducing firewood use, preserving forests

The majority of Malawi's fish processors use firewood to smoke or dry fish, as it is one of the best preservation methods and adds value to fish by improving taste and allowing for more diverse products. Fish processors travel long distances to fetch firewood, increasing the cost of processed fish and demand for firewood adds to a growing concern of deforestation.

Under the Development of Smart Innovation through Research in Agriculture (DeSIRA) project, WorldFish developed a technology that uses briquettes—compact blocks of organic waste for burning on a stove or fire—made from agricultural leftovers such as rice husks and groundnut shells. So far, a total of 395 fish farmers and fish processors have been sensitized to the new technology.

The use of rice husks for briquettes is healthier and more cost-efficient and will lead to an increase in profit margins. The high costs of fetching firewood will also be reduced. The use of briquettes also offers business potential and will also assist afforestation efforts.

### Women leading integrated farmsteads

In Malawi's aquaculture industry, gender and cultural stereotypes hinder women's involvement. The majority of women do not own land, so they face challenges in starting fish farming ventures.

Under the WorldFish Kulima program, farmer field schools are training women to grow fish in water bodies that are integrated into household farms. Fish, livestock, vegetables and crops are combined into one farmstead. The integration of agriculture and aquaculture enables households to access all the food groups within the farmstead and reduce costs associated with buying food.

A farmer field school in Khama within the country's Kasungu district is now training a group of 18 women to diversify their farmsteads. The group dug a fishpond of 600 square meters and stocked it with fish. Three more fishponds were gradually added and seven women went on to dig their own ponds. The group now owns nine ponds that are integrated with bananas, a greenhouse for climate-smart vegetable production and poultry.



## Nigeria

### Kickstarting Nigeria's domestic tilapia farming industry

In 2021, WorldFish entered into an agreement with Premium Aquaculture Limited (PAL)—the country's largest tilapia producer—for the transfer of GIFT to Nigeria. The Bill & Melinda Gates Foundation and USAID through the West Africa Trade Investment Hub are collaborating with WorldFish and PAL to introduce GIFT into Nigerian fish markets by late 2023.

GIFT accounts for a significant portion of global tilapia production. The strain has great potential for alleviating global poverty and hunger and improving nutrition.

This agreement reflects WorldFish's ambitions for future investment in Africa and its small-scale aquaculture producers.

Following requests from the Ministry of Agriculture and Rural Development of Nigeria and multiple stakeholders to support improvement of the tilapia industry in Nigeria, WorldFish initiated the process of transferring the latest generation of GIFT to Nigeria.

In May 2022, more than 50,000 GIFT fry were transferred from WorldFish Headquarters in Malaysia to PAL's secure quarantine facility in Nigeria's Ogun State.



**Our partnership with WorldFish to promote tilapia farming in Nigeria with the help of fast growing tilapia fingerlings and improved farming techniques would definitely assist in increasing farmers income as well as fish production in the country.**



**Govindaraju GS**  
*Premium Aquaculture*



**We are happy to have WorldFish as our partner in developing fisheries resources in Nigeria. I love working with WorldFish because of the depth of their arsenal in terms of new approaches to increasing productivity in the fisheries sector, the political sensitivity deployed by their field staff during program development in Nigeria, a wider appreciation of the cultural diversity in the geographies they serve and how they deploy this cultural sensitivity in program development and relationship building.**



**Audu Grema**  
*Senior Program Officer, Agriculture, Nigeria, Bill & Melinda Gates Foundation*



## Employing Lean Production Systems to improve efficiency in aquaculture value chain

Early work indicates inefficiencies at every point of the aquaculture value chain in Nigeria. Waste of raw-material inputs, waste of space, waste of movement, waste of labor, loss of product (fish) and post-harvest loss (spoilage) are such inefficiencies that increase the cost of production and reduce profit, which in turn make Nigerian aquaculture less competitive in both local and global markets.

In 2021, along with USAID Fish Innovation Lab funding, WorldFish embarked on researching a concept entitled Lean Production Systems, for improving operational efficiency, reducing post-harvest losses, improving waste management and decreasing the cost of production of catfish and tilapia in Nigerian aquaculture.

In June 2021, WorldFish trained 30 cluster farm leaders in the states of Ogun and Delta as Lean Subject Matter Experts. They then took the lead to train fellow farmers to adopt lean management tools to improve farm efficiency.

By the end of 2021, 528 farmers in Delta and Ogun benefited from applying lean management tools to reduce mortality, energy use and feed and transportation costs and improved overall workplace organization.



**The Nigerian Government is being guided by the comprehensive study Nigeria Fish Futures led by WorldFish, in developing our aquatic food systems to nourish our growing nation and provide economic opportunities for our citizens, while respecting environmental health.**



**Mohammad Mahmood Abubaka**

*Hon. Minister of Federal Ministry of Agriculture and Rural Development, Republic of Nigeria & Ime Umoh, Director Federal Department of Nigeria*



## Solomon Islands

### Embedded research for enhanced indigenous aquatic food systems

In 2021, WorldFish Solomon Islands strengthened research for development partnerships. Together with the Ministry of Fisheries and Marine Resources, our national host, we reflected on 35 years of partnership and defined research for development priorities. We signed two new projects, funded by the Australian Center for International Agricultural Research (ACIAR), co-designed with Ministry of Fisheries and Marine Resources (MFMR) to support the priorities in their national fisheries strategies. The Pathways-2 project implements action research on community-based resource management. This is the nationally adopted strategy for sustainable management over coastal fisheries because in Solomon Islands coastal fisheries resources are governed under the customary tenure of indigenous peoples.

During 2021, improved management and more equitable governance over fisheries systems were achieved through the provision of technical support in reviews of management plans and committee work with 10 communities in Western and Malaita Provinces. Reviews were done by 88 women, 148 men and 101 youths. Twelve out of 13 rule changes proposed by women were adopted, as were all 14 rule changes proposed by youth.



## Timor-Leste

### Investment in a WorldFish digital monitoring system

In 2020, the Government of Timor-Leste formally adopted PeskaAAS as the national fisheries monitoring system. Developed by WorldFish, PeskaAAS is a digital reporting system that collects, analyzes and displays data from small-scale fisheries in Timor-Leste in near real-time.

Solar-powered tracking devices record where fishers go fishing and how long they spend at different fishing sites. Upon returning to the beach, the fishers are met by trained community members, who record their catches using smartphones and tablets. The data is then uploaded and published on an online, open-access dashboard the same day.

PeskaAAS has been developed and improved since 2017. In 2018, the project was awarded an Inspire Challenge Award by the CGIAR Big Data Platform. It received an Inspire Challenge scale-up award in 2019 and was a finalist for the Rolex Award for Enterprise in 2021.

A WorldFish impact assessment showed that PeskaAS has improved inter-agency collaboration and increased investment in the fisheries sector.

In 2021, the government assumed financial responsibility for the data collection, upkeep and updating of the system.

## Second public-private partnership tilapia hatchery opens

Timor-Leste's fish farmers have long struggled to source quality fingerlings needed to enhance fish growth and achieve higher yields. The Partnership for Aquaculture Development in Timor-Leste Phase 2 (PADTL2) project led by WorldFish is working with private sector actors and the Ministry of Agriculture and Fisheries to establish GIFT hatcheries under a private-public partnership model.

Inaugurated in October 2021, the Black Bird GIFT hatchery in Lautem municipality was first established in the east of Timor-Leste, partly funded by the New Zealand Ministry of Foreign Affairs and Trade through the PADTL2 project.

The Black Bird hatchery acquires high-quality broodstock from the government GIFT hatchery in Gleno, Ermera. It then multiplies and disseminates GIFT fry and fingerlings to nurseries and farmers. The Gleno hatchery was established in 2016 by phase one of the PADTL project.

The Black Bird hatchery is now critical to progress toward the government's Timor-Leste National Aquaculture Development Strategy 2012–2030. Each year, the hatchery is expected to produce more than 1 million fingerlings. These will be sold to fish farmers in Lautem, nearby municipalities and also non-governmental organizations.

## Tilapia for Dili flood victims

Torrential rain battered the capital city of Dili on April 4, 2021, resulting in a once-in-50-years flood. Countrywide, more than 15,000 people were displaced, including 7000 people in Dili. WorldFish purchased and delivered 710 kg of fresh tilapia to support flood victims at evacuation centers.

The work was supported by the New Zealand Ministry of Foreign Affairs and Trade, one of the founders of the PADTL2 project. The project is co-funded by USAID and implemented by WorldFish in partnership with the Timor-Leste Ministry of Agriculture and Fisheries.



## Zambia

### Improved genetics

Partnered with Zambia's Department of Fisheries, WorldFish conducted a species purity mapping among over 30 hatcheries across the country.

Of the five mapped tilapia species, the most cultured species were the three-spotted tilapia (*Oreochromis andersonii*) and Nile tilapia (*O. niloticus*).

To run the breeding program at the National Aquaculture Resource Center (NARDC) smoothly, a low-cost biosecure hatchery with the capacity of incubating up to 120 families was installed and tested. Broodfish were recruited and screened for the disease prior to inclusion in breeding and mating to produce families.

Training was provided for the Department of Fisheries on fish disease screening for the tilapia lake virus and ulcerative syndrome, two major diseases of economic importance. Over 100 families have been produced, from which a genetically diverse base population will be built for the breeding program.

The genetic improvement program, hosted at the NARDC, at the national breeding center in Mwekera, Kitwe, developed a disease-free foundation broodstock for Nile tilapia.

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**Before, students used to have to go far to Siavonga and Mwekera (Kitwe) for practical lessons, but now they use the center of excellence established by WorldFish at the Aquaculture Skills Training Center project on-campus.**

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**Chrispine Mapanda**  
NRDC Vice Principal

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**Us women were sidelined, but WorldFish incorporated us in their capacity building activities and we are now able to learn and grow fish on our own, which is helping us as mothers to contribute to taking care of our households.**

//

**Women fish farmers**  
Luwingu

## The success of AQ TEVET

Funded by the Norwegian Agency for Development Cooperation, the Aquaculture Technical, Vocational and Entrepreneurship Training (AQ TEVET) for Improved Private Sector and Smallholder Skills Project was implemented in Zambia's Northern, Luapula and Lusaka provinces.

The project's overall objective was to develop the aquaculture knowledge and practical skills of students and smallholder commercial fish farmers. The project reached nearly 1700 farmers in Northern and Luapula provinces with training and extension services. The project developed training materials in Ibibemba (local language), used by private sector companies during extension service delivery and distributed to farmers, and then also available in English, making them accessible to a broader audience.

Following the implementation of the project, nearly 80% of trained farmers adopted components of BMPs for aquaculture that they were introduced to. The mid-term evaluation findings revealed that smallholder farm profit margins increased by 32.6% from 2018 to 2020.



**Profound gratitude goes to WorldFish for the support that they have continued to provide to the government and the people of Zambia. Some of the investments that WorldFish has made in this country include its continued technical support to the government in the genetic improvement of the Kafue bream (*O. andersonii*) under the Zambia Aquaculture Enterprise Development Project, which is meant to enhance the production performance of the species.**



**Anna Songolo**

*Permanent Secretary Ministry of Fisheries and Livestock, Republic of Zambia*



**We used to have challenges supplying our farmers with fish feed, but WorldFish linked us to suppliers and now we are able to access feed easily and distribute it to our farmers.**



**Mubanga Seketeni**

*Feed operator, Mansa*



**The knowledge, skills and learning tools we got from WorldFish are what we use to train farmers in the region. We deliver free extension services and, at the same time, we run online trainings for farmers. The real power of what WorldFish has done for Aller Aqua is the boost or linkages created with farmers.**



**Pricilla Singina**

*Technical Representative, Aller Aqua Fish Feed, Kasama*

# Our contribution to the Sustainable Development Goals



## SDG 1: No Poverty

WorldFish works to create opportunities in sustainable and productive aquatic food systems to help lift out of poverty people who rely on fish for their income, livelihoods and well-being.



## SDG 2: Zero Hunger

Fish and other aquatic foods offer untapped potential to meet the increasing demand for safe, nutritious food. By 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.



## SDG 3: Good Health and Well-being

WorldFish strives to make quality fish available and affordable to the poor in developing countries, particularly women and also children in the first 1000 days of life. Our research informs strategies for combating undernutrition and malnutrition and for preventing public health issues, such as stunting and other non-communicable diseases related to poor diets and nutritional deficiencies.



## SDG 5: Gender Equality

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 they need to be successful. WorldFish addresses gender inequalities to improve women's livelihoods through aquatic food systems, which in turn amplify the benefits of these livelihoods for their children, families and communities.



## SDG 8: Decent Work and Economic Growth

The adoption of 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 a business and other entrepreneurial activities, especially for poor women and youths, are also vital to our contribution to this SDG, particularly in Small Island Developing States.





## SDG 9: Industry, Innovation and Infrastructure

WorldFish works 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.



## SDG 12: Responsible Consumption and Production

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.



## SDG 13: Climate Action

Global fishstocks have been reduced by overfishing, ineffective management practices, industrial development, agricultural pollution and the impacts of climate change. 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.



## SDG 14: Life Below Water

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 CGIAR members, WorldFish is uniquely positioned to contribute to this SDG. We focus on evidence-based solutions relating to sustainable ocean governance and the development of an inclusive and people-centered blue economy, with special attention to the contribution of small-scale fisheries.



## SDG 15: Life On Land

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

Our impact is enhanced when we bring together diverse backgrounds, skills, disciplines, talents and partnerships. These shape our organizational culture, ways of working and our aspiration to be a global thought leader.

### Our LEAD values

**L****Learning**

We are relentlessly curious. We 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.

**E****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.

**A****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.

**D****Diversity**

People with different ideas, talents, disciplines and backgrounds make our work distinct. We encourage differing perspectives, healthy debate and an inclusive environment for all and at every level, to create solutions to complex problems.

## Corporate function key initiatives

### Management Information Systems

Multifactor authentication has been rolled out to all staff, providing additional protection and reduced risks of compromised passwords. All staff can now access payslips online with a payroll system that is enabled for all country offices. Six additional dashboards have been deployed to help businesses monitor progress in their respective areas. Active directory data is now automatically synced from the One Corporate System staff profile to reduce human error and delays in data updates. Approximately 4,000 support tickets were submitted in 2021 and 99% have been closed.

### Risk, compliance and ethics

In 2020, a Risk and Compliance function was introduced to support the development of a fit-for-purpose control environment and strengthen risk management capabilities. Since then, several initiatives to improve the overall Counter Fraud and Ethics Policy framework on how misconduct allegations are addressed in the organization.

Key achievements include refreshing the Anti-Fraud Policy (created and last updated in November 2016) and whistleblowing Policy (designed and last updated in 2007) and creating a Conflict-of-Interest Policy. The revised guidelines clearly define our zero tolerance toward all forms of fraud, waste and abuse.

Staff onboarding now includes Mandatory Ethics and Risk Management training. Training and other outreach activities have also been provided to many countries, including partners working with us on the Feed the Future Programme in Bangladesh.

### Project Management Unit

Restructuring of the WorldFish Project Management Unit (PMU) is now complete. All goals set for the year have been met. The PMU became WorldFish's central hub for all project management functionality. It ensures adherence to project management standards, procedures and practices. It ensures projects are delivered with the highest research quality, best management practices and international standards with a key focus on compliance, accountability, efficiency and best practices.

## Communicating science knowledge and evidence

*Communications for impact* is a critical element of our new strategy and seeks to position WorldFish's global thought leadership as an addressor of critical sustainable development challenges such as nutrition, climate change, gender and social inclusion and environmental sustainability through pioneering research and innovation on aquatic food systems.

Together with our strategic funding and implementing partners, we want to influence, develop, deliver and scale high-impact research and evidence-based innovations and policy recommendations that support vulnerable communities in low-and middle-income countries to meet their 2030 Sustainable Development Goals.







## Impacts

53,463  
followers on LinkedIn



12,745  
new followers on  
LinkedIn in 2021

22,925  
followers on Facebook



3,767  
new followers on  
Facebook in 2021

19,152  
followers on Twitter



2,118  
new followers on  
Twitter in 2021

Featured in  
5,280  
news articles



(For more information, visit our News section on the website:  
<https://www.worldfishcenter.org/newsroom>)

Hosted and engaged in  
196 global and regional events

(For more information, visit our Events section on the  
website: <https://www.worldfishcenter.org/events>)



367 publications produced and made publicly  
accessible online

(For more information, visit our digital archive:  
<https://digitalarchive.worldfishcenter.org>)





## Selected publications





## Environmental performance of blue foods

**Publisher:** Nature Research

**Theme:** Sustainability, Environmental Impact

**MEL Pub Type:** Journal Article

**URL:** <https://hdl.handle.net/20.500.12348/4906>

**Journal Impact Factor:** 50



**Altmetric Score:** 370

**Altmetric URL:** <https://www.altmetric.com/details/113494266>

**Authors:** Jessica A. Gephart, Patrik J. G. Henriksson, Robert W. R. Parker, Alon Shepon, Kelvin D. Gorospe, Kristina Bergman, Gidon Eshel, Christopher D. Golden, Benjamin S. Halpern, Sara Hornborg, Malin Jonell, Marc Metian, Kathleen Mifflin, Richard Newton, Peter Tyedmers, Wenbo Zhang, Friederike Ziegler and Max Troell.

**Summary:** Fish and other aquatic foods (blue foods) present an opportunity for more sustainable diets. The analysis identifies high-performing blue foods, highlights opportunities to improve environmental performance, advances data-poor environmental assessments and informs sustainable diets.

## Compound climate risks threaten aquatic food system benefits

**Publisher:** Nature Research

**Theme:** Climate Change, Sustainable Aquaculture

**MEL Pub Type:** Journal Article

**URL:** <https://hdl.handle.net/20.500.12348/4978>

**Journal Impact Factor:** -



**Altmetric Score:** 281

**Altmetric URL:** <https://www.altmetric.com/details/113493758>

**Authors:** Michelle Tigchelaar, William W. L. Cheung, Essam Yassin Mohammed, Michael J. Phillips, Hanna J. Payne, Elizabeth R. Selig, Colette C. C. Wabnitz, Muhammed A. Oyinlola, Thomas L. Frölicher, Jessica A. Gephart, Christopher D. Golden, Edward H. Allison, Abigail Bennett, Ling Cao, Jessica Fanzo, Benjamin S. Halpern, Vicky W. Y. Lam, Fiorenza Micheli, Rosamond L. Naylor, U. Rashid Sumaila, Alessandro Tagliabue and Max Troell.

**Summary:** Aquatic foods from marine and freshwater systems are critical to the nutrition, health, livelihoods, economies and cultures of billions of people worldwide, but climate-related hazards may compromise their ability to provide these benefits. Here, we estimate national-level aquatic food system climate risk using an integrative food systems approach that connects climate hazards impacting marine and freshwater capture fisheries and aquaculture to their contributions to sustainable food system outcomes.

## Harnessing the diversity of small-scale actors is key to the future of aquatic food systems

**Publisher:** Nature Research

**Theme:** Nutrition, Sustainability, Poverty Reduction

**MEL Pub Type:** Journal Article

**URL:** <https://hdl.handle.net/20.500.12348/4884>

**Journal Impact Factor:** -



**Altmetric Score:** 266

**Altmetric URL:** <https://www.altmetric.com/details/113493761>

**Authors:** Rebecca E. Short, Stefan Gelcich, David C. Little, Fiorenza Micheli, Edward H. Allison, Xavier Basurto, Ben Belton, Cecile Brugere, Simon R. Bush, Ling Cao, Beatrice Crona, Philippa J. Cohen, Omar Defeo, Peter Edwards, Caroline E. Ferguson, Nicole Franz, Christopher D. Golden, Benjamin S. Halpern, Lucie Hazen, Christina Hicks, Derek Johnson, Alexander M. Kaminski, Sangeeta Mangubhai, Rosamond L. Naylor, Melba Reantaso, U. Rashid Sumaila, Shakuntala H. Thilsted, Michelle Tigchelaar, Colette C. C. Wabnitz and Wenbo Zhang.

**Summary:** Small-scale fisheries and aquaculture (SSFA) provide livelihoods for over 100 million people and sustenance for ~1 billion people, particularly in the Global South. This heuristic framework can inform adaptive governance actions supporting the diversity and vital roles of SSFA in food systems and in the health and livelihoods of nutritionally vulnerable people—supporting their viability through appropriate policies while fostering equitable and sustainable food systems.

## Gender equality in climate policy and practice hindered by assumptions

**Publisher:** Nature Research

**Theme:** Climate Change, Social Sciences

**MEL Pub Type:** Journal Article

**URL:** <https://hdl.handle.net/20.500.12348/4553>

**Journal Impact Factor:** 20.9



**Altmetric Score:** 234

**Altmetric URL:** <https://www.altmetric.com/details/101261979>

**Authors:** Sarah Lawless, Philippa J. Cohen, Sangeeta Mangubhai, Danika Kleiber and Tiffany H. Morrison.

**Summary:** Gender equality is a mainstream principle of good environmental governance and sustainable development. Progress toward gender equality in the fisheries sector is critical for effective and equitable development outcomes in coastal countries. The methodological approach developed holds value for other development sectors to critically examine, and subsequently enhance, commitment toward gender equality.



## Ten people-centered rules for socially sustainable ecosystem restoration

**Publisher:** Wiley

**Theme:** Legal Rights, Social Inclusion, Stakeholders, Tenure, Restoration, Social Participation, Community Involvement

**MEL Pub Type:** Journal Article

**URL:** <https://hdl.handle.net/10568/116517>

**Journal Impact Factor:** -



**Altmetric Score:** 172

**Altmetric URL:** <https://www.altmetric.com/details/114746778>

**Authors:** Elias M, Kandel M, Mansourian S, Meinzen-Dick R, Crossland M, Joshi D, Kariuki J, Lee LC, McElwee, P, Sen A, Sigman E, Singh R, Adamczyk EM, Addoah T, Agaba G, Alare RS, Anderson W, Arulingam I, Kung S, Bellis V, Birner R, De Silva S, Dubois M, Duraisami M, Featherstone M, Gallant B, Hakhu A, Irvine R, Kiura E, Magaju C, McDougall C, McNeill GD, Nagendra H, Huu Nghi T, Okamoto DK, Paez Valencia AM, Pagella T, Pontier O, Post M, Saunders GW, Schreckenberger K, Shelar K, Sinclair F, Gautam RS, Spindel NB, Unnikrishnan H, Wilson GN and Winowiecki L.

**Summary:** As the UN Decade on Ecosystem Restoration begins, there remains insufficient emphasis on the human and social dimensions of restoration. The potential that restoration holds for achieving both ecological and social goals can only be met through a shift toward people-centered restoration strategies. Toward this end, this paper synthesizes critical insights from a special issue on "Restoration for whom, by whom" to propose actionable ways to center humans and social dimensions in ecosystem restoration, with the aim of generating fair and sustainable initiatives.

## Blind spots in visions of a "blue economy" could undermine the ocean's contribution to eliminating hunger and malnutrition

**Publisher:** Cell Press

**Theme:** Fisheries, Food Security, Mariculture

**MEL Pub Type:** Journal Article

**URL:** <https://hdl.handle.net/20.500.12348/4493>



**Journal Impact Factor:** -

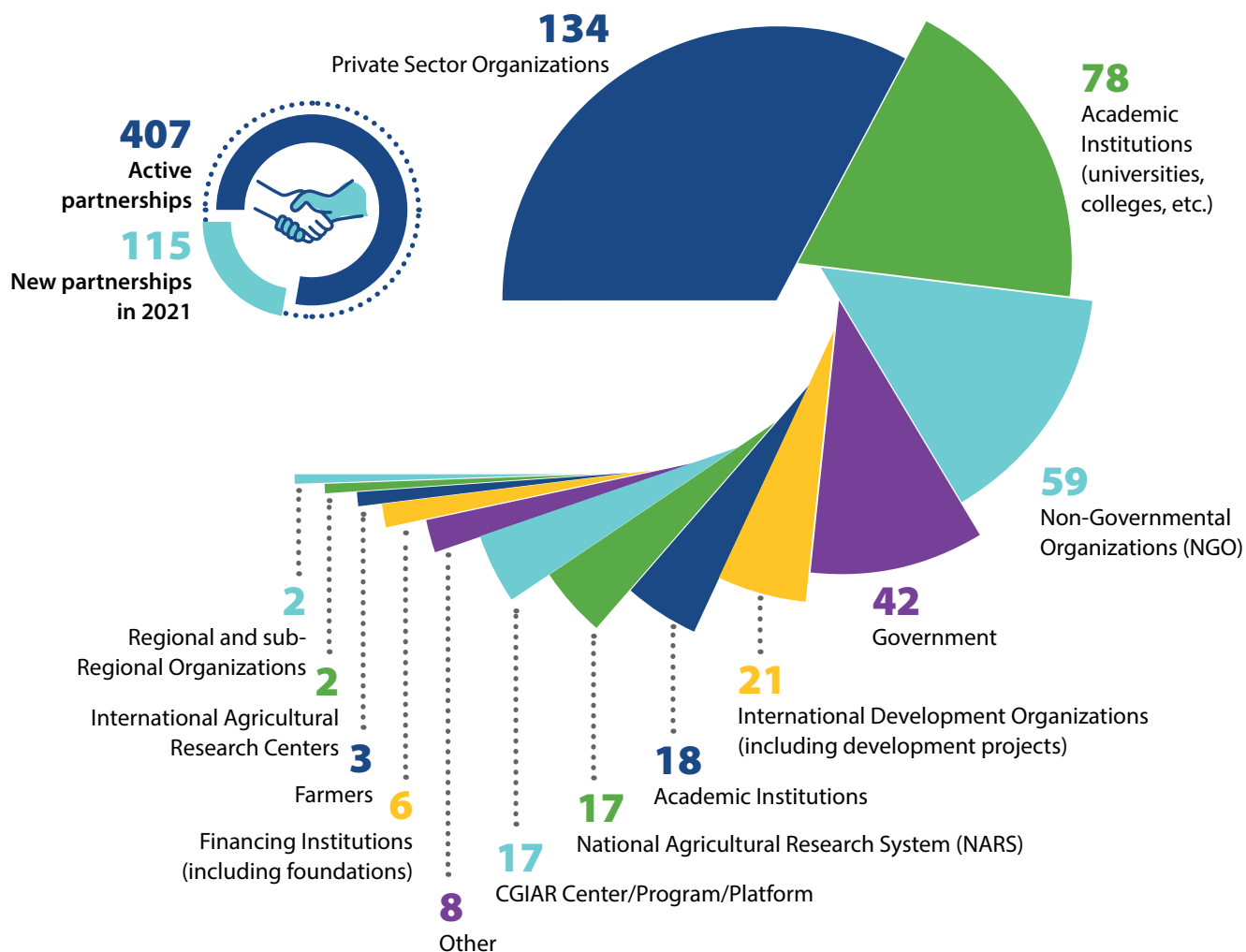
**Altmetric Score:** 122

**Altmetric URL:** <https://www.altmetric.com/details/98611857>

**Authors:** Anna K. Farmery, Edward H. Allison, Neil L. Andrew, Max Troell, Michelle Voyer, Brooke Campbell, Hampus Eriksson, Michael Fabinyi, Andrew M. Song and Dirk Steenbergen.

**Summary:** Increasing the production of food from the ocean is seen as a pathway toward more sustainable and healthier human diets. Yet this potential is being overshadowed by competing uses of ocean resources in an accelerating "blue economy." This publication urges for a broader food-system approach beyond production and to also consider food access, affordability and consumption will refocus the blue food agenda on making production and consumption more equitable and sustainable while increasing access for those who need it most.

## Partners



## WorldFish collaborations across CGIAR

### CGIAR Antimicrobial Resistance Hub

WorldFish, the International Livestock Research Institute, International Food Policy Research Institute (IFPRI) and the International Water Management Institute shared research from post-doc and collaborative initiatives on modeling antimicrobial resistance (AMR) in water systems and assessing and reducing AMR use in aquaculture.

### CGIAR COVID-19 Hub

This partnership connected FISH research through participation in CGIAR's COVID-19 working groups and research, including working groups on value chain fractures and One Health in supporting country responses.

### CGIAR Research Program on Policies, Institutions, and Markets

Collaborations included a CGIAR foresight report with all CGIAR centers, foresight research in Nigeria and the development of a fish module for the IMPACT model. Several co-investments were also made in aquaculture value chains and COVID-19 research in Ghana, Nigeria and India. Collaborative research was done to understand fish futures and the development of foresight modeling tools.

### CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

Collaboration with the CCAFS was strengthened across FISH in several areas:

1. CCAFS Flagship 4 (Climate Services and Safety Nets) on increasing access to climate information services to aquaculture farmers and fishers in Bangladesh and Odisha, India
2. Development of a “fish” component in Mali and Zambia within the new World Bank-funded Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) project
3. Development of the Two Degree Initiative (2DI), mainly through two “challenges,” the first addressing climate change in Asian mega-deltas (with the International Rice Research Institute and IWMI) and the second a Blue Challenge covering the Pacific, South Asia and the African Great Lakes (with IWMI and regional partners).

## Roots, Tubers and Bananas

A food system integration published story captures synergies between fish and roots, tubers and bananas in food systems, focusing on Nigeria and Bangladesh. The cooperation was also extended to new research in the African Great Lakes region. Collaborative research was developed to integrate scientific approaches and policy work around food systems.

## IFPRI, WorldFish

An analytical framework was developed to guide research engagement in the policy process, with application to small-scale fisheries. The framework was developed to understand the impact of research on policy processes.

## Water, Land and Ecosystems

A partnership with the CGIAR Research Program on Water, Land and Ecosystems (WLE) combined complementary research interests, including refinements to ecosystem-based approaches to fisheries management and associated innovations and relations between landscapes and diets in Myanmar.

Joint funding was successfully pursued, as were the design and delivery of scientific research.

## WorldFish, IRRI, IWMI, Center for International Forestry Research

Collaboration with the IWMI for the establishment of the Inland Fisheries Alliance promoted sustainable inland fisheries and contributed to increased awareness of inland fisheries at UNFSS and elsewhere.

Interdisciplinary research and potential for policy and practice influenced the increase in the sustainability of inland fisheries.

## WLE, particularly the flagship on Managing Resources, Risks and Competing Uses for Resilience

WorldFish and the IWMI partnered on a WLE-led project investigating gender in the highly vulnerable wetlands in transition to the Ramsar conservation areas in the Gulf of Mottama, Myanmar. WorldFish is playing the role of senior gender advisor to the project, partnering with the IWMI gender leader.

Lessons were applied from FISH regarding methodologies to assess inclusion-exclusion in governance, drawing on earlier CGIAR GENNOVATE methodologies, as well as applying Aquatic Aquaculture Systems (AAS) and FISH insights regarding GTAs.



## IFPRI, PIM

Collaborative research and co-investment were made into global synthesis research on policy impacts and COVID-19 research.

## PIM, IFPRI, ILRI, IRRI, IWMI, RTB, CIP, IITA, WLE

Actively participated to develop the CGIAR Seed Systems Strategy. A case study on the tilapia seed system in Bangladesh was compiled in collaboration with other CGIAR colleagues.

## ICARDA, CIP, IITA and the RTB and GLDC CRPs

Close cooperation with other key centers and CRPs has continued since 2018 to refine and develop the MEL platform. Communication material and training tools have been jointly developed and training provided to all FISH researchers. Webinars to support the development of the 2021 POWB as well as refresher demos to augment online planning exercises via the MEL platform were collaboratively conducted by three CRPs.

The efficiency and effectiveness of FISH have increased through MEL and cross-center/CRP cooperation and support for capacity development.

## Our investors

### Academic or Research Institute



- Lilongwe University of Agriculture and Natural Resources
- Mississippi State University
- Rajiv Gandhi Center for Aquaculture
- Stockholm Resilience Centre
- Synergos Institute
- University of Exeter
- University of Malawi, Chancellor College
- University of Wollongong
- Wageningen University & Research
- World Vegetable Center

### CGIAR Center



- AfricaRice
- International Center for Tropical Agriculture
- International Food Policy Research Institute
- International Institute of Tropical Agriculture
- International Livestock Research Institute
- International Maize and Wheat Improvement Center
- International Potato Center
- International Water Management Institute

### Foundation



- Bill & Melinda Gates Foundation
- International Maize and Wheat Improvement Center
- Margaret A. Cargill Philanthropies
- Minderoo Foundation
- Oak Foundation
- Schmidt Family Foundation
- Walton Family Foundation

### Governments



- Assam Rural Infrastructure & Agricultural Services Society
- Australian Centre for International Agricultural Research
- Bangladesh Local Government Engineering Department
- Centre for Environment, Fisheries and Aquaculture Science
- Department of Fisheries, Malawi
- Deutsche Gesellschaft für Internationale Zusammenarbeit
- Egypt Ministry of Agriculture and Land Reclamation
- European Commission
- Fisheries and Animal Resources Development Department, Odisha
- Foreign, Commonwealth & Development Office, UKaid
- India Ministry of Agriculture and Farmers Welfare

- Japan International Cooperation Agency
- Malawi The Ministry of Agriculture and Food Security
- Ministry of Fisheries and Livestock, Zambia
- New Zealand-Ministry of Foreign Affairs and Trade
- Norway Ministry of Foreign Affairs
- Norwegian Agency for Development Cooperation
- South Africa Department of Agriculture, Forestry and Fisheries
- Timor-Leste, Democratic Republic of-Ministry of Agriculture and Fisheries
- United States Agency for International Development

## Private sector

- De Heus Limited Liability Company
- Skretting Egypt



## Others

- Australian Volunteers International



## International and Regional Organizations



- African Development Bank
- CGIAR System Organization
- Food and Agriculture Organization
- International Fund for Agricultural Development
- International Institute for Environment and Development
- ISTITUTO OIKOS Onlus
- Pacific Community
- US Soybean Export Council
- Winrock International

## Financial overview

### STATEMENT OF FINANCIAL POSITION (USD '000)

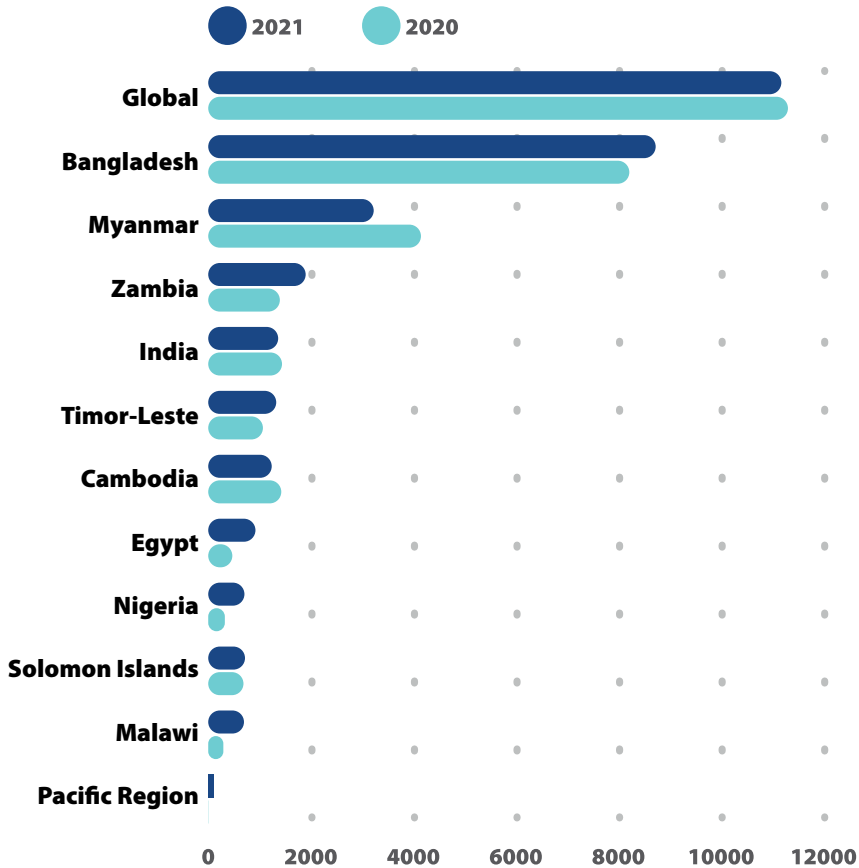
	As of Dec. 31, 2021	As of Dec. 31, 2020
<b>ASSETS</b>		
Cash and cash equivalents	15,211	18,048
Accounts receivable	4,379	3,098
Other current assets	243	330
Non-current assets	827	684
<b>TOTAL ASSETS</b>	<b>20,660</b>	<b>22,106</b>
<b>LIABILITIES</b>		
Accounts payable	10,920	12,605
Accruals and provisions	1,534	1,375
Other current liabilities	198	199
Non-current liabilities	858	477
<b>TOTAL LIABILITIES</b>	<b>13,510</b>	<b>14,656</b>
<b>NET ASSETS</b>	<b>7,150</b>	<b>7,504</b>
<b>TOTAL LIABILITIES AND NET ASSETS</b>	<b>20,660</b>	<b>22,106</b>

### STATEMENT OF OPERATING ACTIVITIES (USD '000)

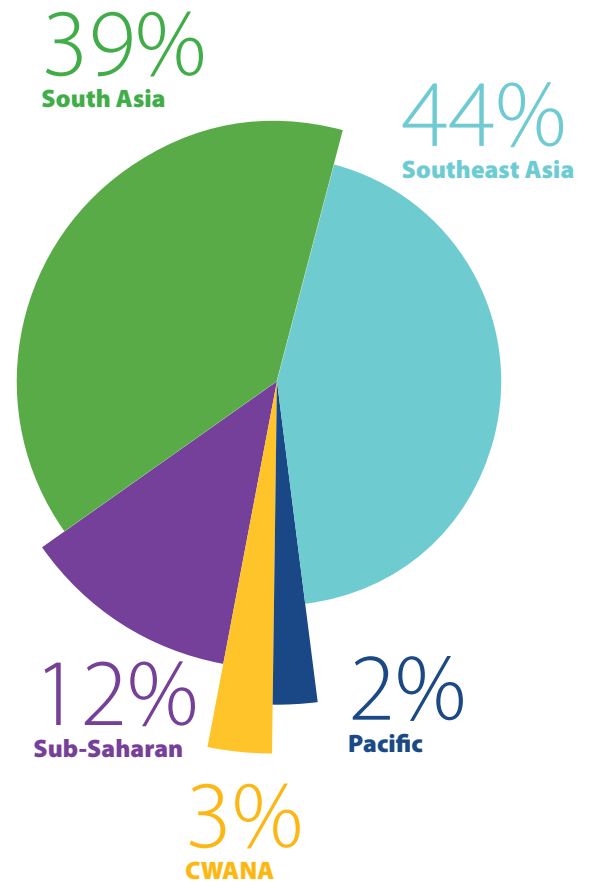
	For the years ended December 31	
	2021	2022
<b>REVENUE</b>		
Grants	32,002	30,769
Other current assets	661	555
<b>TOTAL REVENUE</b>	<b>32,663</b>	<b>31,324</b>
<b>EXPENSES</b>		
Research	21,573	20,722
Administration, support and other	11,444	11,312
<b>TOTAL EXPENSES</b>	<b>33,017</b>	<b>32,034</b>
<b>NET DEFICIT</b>	<b>(354)</b>	<b>(710)</b>



## Funding by country



## Expenditure by region 2021



## Our people

We are a diverse, global group of people with 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. It monitors progress toward the achievement of the organization's mission and it sets and approves programs and policies and financial regulations.

- **Baba Yusuf Abubakar**, Chair of the Board of Trustees
- **Alyssa Jade MacDonald-Baertl**, Vice Chair of the Board of Trustees
- **Ayman Anwar Ammar**, Ex-Officio Board Member
- **Gareth Johnstone**, Ex-Officio Board Member
- **Tarmidzi Ramly**, Ex-Officio Board Member
- **Alice Ruhweza**, Board Member
- **Abdou Tenkouano**, Board Member
- **Cristina Rumbaitis del Rio**, Board Member
- **Hilary Wild**, Board Member
- **Lindiwe Sibanda**, Board Member
- **Marco Ferroni**, Board Member
- **Neal Gutterson**, Board Member
- **Patrick Caron**, Board Member
- **Shenggen Fan**, Board Member

### Executive team (term ended December 2021)

The Executive Team realizes the strategy, research agenda and organizational vision for WorldFish. It takes decisions on issues that affect the organization at all levels.

- **Gareth Johnstone**, Director General & CGIAR Senior Director of Aquatic Food Systems
- **Edward Allison**, Interim Director of Science and Research
- **Tana Lala-Pritchard**, Executive Director, Strategy, Innovation and Communication
- **Marion Barriskell**, Executive Director, Corporate Services
- **Montgomery Simus**, Executive Director, Global Growth and Development
- **Michael Phillips**, Director, Aquaculture and Fisheries Science for CGIAR Research Program on Fish Agri-Food Systems (FISH)

### Global research leaders

Our global research leaders are responsible for the overall coordination and management of our research agenda.

- **Benjamin Belton**, Interim Global Lead, Social and Economic Inclusion
- **Essam Yassin Mohammed**, Global Lead, Climate and Environmental Sustainability
- **Shakuntala Haraksingh Thilsted**, Global Lead, Nutrition and Public Health
- **Cynthia McDougall**, Gender Research Leader
- **John Benzie**, Research Program Leader, Sustainable Aquaculture
- **Philippa Cohen**, Research Program Leader, Resilient Small-scale Fisheries
- **Cristiano Rossignoli**, Monitoring, Evaluation and Learning (MEL) and Impact Assessment Research Leader

## Country directors and regional 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 and strengthens institutional and partner capabilities across the aquaculture and fisheries sectors. This includes building capacities, influencing policies and evidence-based research capabilities.

- **Ahmed Mohamed Nasr-Allah**, Country Director, Egypt
- **Delvene Boso**, Country Director, Solomon Islands
- **Mark Dubois**, Officer in Charge, Cambodia
- **Sunil Siriwardena**, Officer in Charge, Nigeria
- **Victor Siamudaala**, Country Director, Zambia and Southern Africa
- **Christopher Price**, Regional Director, South Asia
- **Michael Akester**, Regional Director, Southeast Asia and Pacific (SEAP)

## Key corporate function leads

- **Anar Khalil**, Project Management Lead
- **Faridah Ibrahim**, Business Development Lead
- **Florine Lim**, Team Leader, Communications and Marketing
- **Glenda Munyukwi**, Global Risk and Compliance Lead
- **Hector Morais**, Global Procurement Lead
- **Cherry Kek**, Global Budgeting and Reporting Lead
- **Patric Lim**, Management Information Systems Lead
- **Reinier Hille Ris Lambier**, Strategic Planning Lead
- **Simon Carter**, Global Financial Controller
- **Eli Wong**, Global HR Lead



**Investing in sustainable management of aquatic ecosystems and transitioning to aquatic food-based diets offer a huge opportunity in putting our food systems on a low emissions pathway - delivering a triple win for nature, people and climate.**



**Essam Yassin Mohammed**  
*Global Lead, Climate and Environmental Sustainability*

## Where we work

### Egypt

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Email: worldfish-egypt@cgiar.org

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### Zambia

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Email: worldfish-zambia@cgiar.org

### Malawi

Email: worldfish-malawi@cgiar.org

### Headquarters

#### Malaysia

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Email: worldfishcenter@cgiar.org

### Cambodia

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Email: worldfish-cambodia@cgiar.org

### Solomon Islands

Tel: +677 25080, +677 25090

Email: worldfish-solomon@cgiar.org

### Myanmar

Tel: +950 1647 521

Email: worldfish-myanmar@cgiar.org

### Bangladesh

Tel: +88 09 6023 20095, 20099

Email: worldfish-bangladesh@cgiar.org

### Timor-Leste

+670 670 77658251

Email: worldfish-TL@cgiar.org

### India

Email: worldfish-india@cgiar.org



## 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.

The WorldFish headquarters is in Penang, Malaysia, with regional offices across Africa, Asia and the Pacific. The organization is a member of 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](http://www.worldfishcenter.org)