

# Final Report

2020

Project Title: **Managing Aquatic Agricultural Systems to Improve Nutrition and Livelihoods in Selected Asian and African Countries: Scaling Learning from IFAD-WorldFish Collaboration in Bangladesh**

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to

**The International Fund for Agricultural Development**





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### **Disclaimer**

The authors accept full responsibility for the contents of this report. The report does not necessarily reflect the views of the European Commission or IFAD.

## Summary (Max. 6 Pages)

### 1. Programme goals and objectives

The overall goal of the project is to improve nutrition and livelihoods of poor, rural households in aquatic-agricultural systems in Cambodia, Zambia and Indonesia through increased intakes of micronutrient-rich small fish and vegetables from own production, as well as through increased household income.

The objective of the project was to scale up the nutrition-sensitive fish agri-food systems approach in targeted communities in selected countries. Specifically, the objectives of the project were:

- To improve production and productivity of household pond and dykes using innovative technologies that include small fish and carps in ponds, and micronutrient-rich vegetables on dykes and in homestead gardens;
- To increase small fish production and fish species diversity in wetlands through sustainable management and enhanced stocking of micronutrient-rich small fish;
- To conduct SBCC to increase consumption of micronutrient-rich small fish and vegetables, especially in women and children;
- To improve gender equality and women's empowerment; and
- To develop partnerships through regional institutions to adopt and disseminate the nutrition-sensitive fish agri-food systems approach.

### 2. Programme outputs and outcomes

Four outcomes were identified from the project as follows:

- Increase availability, access and consumption of micronutrient-rich small fish and vegetables in targeted population groups in the selected countries;
- Improved gender equity and women's empowerment, especially regarding intra-household food intake, agricultural practices and work load;
- Increased knowledge, awareness and training of government, national and NGO partners in nutrition-sensitive fish agri-food systems approach for influencing policies and implementing interventions for scaling up; and
- Strong regional and national partnerships and collaboration for adoption and dissemination of the nutrition-sensitive fish agri-food systems approach.

### 3. Key achievements against targets

WorldFish and partners have achieved results that were significant against the project targets that were developed earlier. Through this project, WorldFish has successfully introduced pond polyculture and integrated fish-vegetable production systems in the target countries

to increase availability, access and consumption of micronutrient-rich small fish in the target countries.

WorldFish has also successfully conducted trainings and workshops that promoted gender awareness and equity, and had empowered women to take ownership of production, maintenance and distribution of small fish from their ponds. Women were further empowered to make better decisions on food distribution and dietary diversity within the households.

Workshops and trainings were held to increase knowledge and awareness of various stakeholders including government national and international NGO partners in nutrition-sensitive fish-agri food systems approaches in the target countries. Policy briefs were also developed to scale up and promote the adoption of the approach in a larger scale.

#### 4. Progress from the previous report

The field activities of the project in Cambodia ended in November 2019 and was reported in the previous report. In Zambia, an international workshop took place in February, followed by the final sampling and endline study in March. No other trainings were conducted in both countries since previously reported. Two policy briefs were developed from the workshop in Zambia and has been circulated for stakeholders consultation and comments. A separate workshop was held in Malawi, in late February, to scale up the nutrition-sensitive fish agri-food systems approach there, and to explore the opportunities of engagement with partner organizations in Malawi. An international workshop was planned for Indonesia, but was postponed indefinitely due to the COVID-19 pandemic.

#### 5. Innovations (if applicable) and scaling up/adoption of innovations

This project was designed with the objective to scale up the nutrition-sensitive fish agri-food systems approach that was previously piloted successfully in Bangladesh. The approach uses fish as an entry point to address issues of malnutrition while improving livelihoods of poor, rural households engaged in aquatic-agricultural systems in the target countries. Two pathways were identified through this approach – pond polyculture and integration of fish-vegetable systems – and implemented to increase consumption of micronutrient-rich small fish within these households.

#### 6. International Public Goods

- WorldFish is committed to publish the two policy briefs for Zambia in 2020. The draft documents were circulated to partners and stakeholders for refinement and feedback.
- WorldFish is further producing a working paper on nutrient-rich fish products in Zambia and Malawi, a proceedings from the international workshop in Zambia and three blog articles to promote the visibility of the project.

- A factsheet was developed by WorldFish for nutrition-sensitive fish agri-food systems in Cambodia in 2017 and is used as an educational and information dissemination tool to promote pond polyculture.

## 7. Gender

This project was designed with the specific objective of improving gender equity and women empowerment as a desired outcome. Women in Cambodia and Zambia were trained to take ownership of ponds, manage the production of fish and vegetables from the systems, and the management of household income to improve dietary diversity and distribution within the household. Project farmers and staff were also trained through training sessions and workshops on gender awareness and equity, and actions from these trainings were implemented throughout the project.

## 8. Youth Issues

This project targeted youth as beneficiaries and youth were trained in pond management, harvesting and processing of small fish into fish products. Youths were also indirectly engaged through the employment by project farmers in Zambia, to establish and maintain the homestead ponds.

## 9. Climate and Environment

This project did not identify climate and environmental impacts as its direct objectives through the implementation of the project. However, the introduction and implementation of pond polyculture in homestead ponds are seen as ways to promote a circular economy within the production systems. Food and kitchen waste is used as fish feed in these homestead ponds, and pond water is used to irrigate the vegetable plots by the ponds.

## 10. Nutrition Focus

This project utilized micronutrient-rich small fish as an intervention to increase dietary diversity, availability and access of nutritional foods by households in rural areas of Cambodia and Zambia. These micronutrient-rich small fish are sourced from local water bodies and cultivated in homestead ponds or rice field ponds, alongside with commercial aquaculture species such as carp and tilapia species. These small fish species were partially harvested throughout the production cycle, enabling easier inclusion of fish in household meals. Small fish also make for more equal distribution of animal-source food within the household, as compared to distribution of large fish, which is traditionally reserved for the head of the household and men.

## 11. Knowledge Management

Exchange visits were also organized to Penang, India and Japan to learn about technologies, skills and systems to facilitate the

implementation of pond polyculture and nutrition-sensitive approaches in target countries.

In-country training were conducted in Cambodia and Zambia to impart knowledge and skills to partners such as extension officers from Department of Fisheries, Peace Corp volunteers and project farmers to implement the project. Training on other topics such as hygiene and sanitation and gender empowerment was also conducted.

## 12. Scaling up Potential of the project or activities

Through this project, WorldFish had proposed scale up measures in several other countries including Myanmar, Malawi, Ghana and Kenya. Discussions were held to develop integrated fish-rice production systems in the deltas of Myanmar and Bangladesh. A project proposal was also submitted to initiate integrated fish-rice-vegetable food systems in Ghana and Kenya to IFAD, and WorldFish will be initiating this project in late 2020/early 2021.

In Zambia, discussions were held with GIZ and JICA to scale up the project in other regions, including Luapula. GIZ had a field visit to the project in Luwingu in March, and is expected to have further discussions to explore potential for scaling up in the future, in Zambia as well as in other countries, including Malawi.

## 13. Partnerships

WorldFish established partnerships with government agencies, international and local non-governmental organizations, research institutions and private partners in the three targeted countries to facilitate the successful implementation of the project. WorldFish worked with the Fisheries Administration (FiA) of Cambodia, Department of Fisheries and Ministry of Health in Zambia and the Ministry of Maritime Affairs and Fisheries (MMAF) of Indonesia to introduce nutrition-sensitive fish agri-food systems in these countries. WorldFish also partnered with organizations, including GiZ, USAID, Peace Corps program and local NGOs to conduct training, monitoring and capacity building for the project.

## 14. EC/IFAD visibility activities

The project has successfully promoted the EC and IFAD brand through our workshops, publications and communication materials developed within the project. Four workshops were successfully held from 2017 until 2020, two blog posts were published on WorldFish-affiliated channels, with two more are under review for publication, and two videos were developed to promote the project activities and approaches in Cambodia.

## 15. Conclusions

This project came to a close on 31<sup>st</sup> March 2020, with successful results and significant transformations across aquatic-agricultural landscapes in Cambodia

and Zambia. Through this project, households in rural Cambodia were given the opportunity to integrate micronutrient-rich small fish into limited water bodies such as homestead ponds and rice field ponds, hence increasing the availability and accessibility of fish as part of household diets. The trainings conducted through this project successfully raised awareness on several key issues, including the importance of micronutrient-rich small fish in combatting malnutrition; women's and youth's ability to affect change through aquaculture management; and diversification and management of income to improve dietary diversity and food and nutrition security within households. This is further reflected through successful innovations such as the incorporation of fish powder into a snack for complementary feeding in Cambodia, and the establishment of women's cooperative to stock and distribute small fish stock in Zambia. The COVID-19 pandemic had affected the project implementation in Indonesia, as the stakeholder's consultative workshop to review and refine the policy briefs developed for Indonesia was postponed indefinitely. This had further delay efforts to introduce and implement nutrition-sensitive fish-agri food systems in rural communities and households in Indonesia.

## **MAIN REPORT:** *(Max. 20 Pages excluding Annexes and Appendices)*

### **I. BACKGROUND**

The nutrition-sensitive fish agri-food system was first introduced in Bangladesh through the IFAD-funded WorldFish 'Small Fish for Nutrition' project from 2010 to 2013, whereby the innovative technologies for production of carp and other micronutrient-rich small fish species were refined and integrated through community-based sustainable wetlands. The project focused on aspects including the increased fish production and productivity, and consumption of micronutrient-rich small fish in the first 1,000 days of life (a critical stage of child development from conception to two years of age). The approach engaged both men and women in agricultural production systems, combining innovative technologies and social behaviour change communication (SBCC) methods and tools in achieving desired outputs in community, family and individual levels. The implementation had resulted in further scale up to reach 200,000 households in six years and the enhanced stocking of small fish species in 200 water bodies, and these were done in collaboration with other partner agencies. WorldFish and the Ministry of Fisheries and Livestock had also produced policy briefs, brochures, a TV spot, radio programs, and held workshops and training sessions to implement this nutrition-sensitive fish agri-food systems approach in Bangladesh.

Building on the success and growing interest from the implementation of the approach in Bangladesh, this project was developed with the aim to scale up and implement similar approaches in other aquatic-agricultural systems, in selected countries where fisheries resources have significant potential to improve food and nutrition security and livelihoods. Three countries were selected for this project, namely Cambodia, Zambia and Indonesia.

- Cambodia – The rural populations of Cambodia is highly dependent on aquatic and agricultural systems and small fish can provide an important animal-source food, supplying essential micronutrients, fatty acids and animal protein to the diet. However, the dietary diversity of Cambodia is low, and the increase of fish production and productivity can contribute to improved food and nutrition security and livelihoods in Cambodia.
- Zambia – In Zambia, an estimated 70,000 people depend on fisheries and aquaculture for their livelihoods and food. Ineffective management of these resources, together with increasing fishing pressure, environmental degradation and climate change had resulted in the dwindling stocks throughout the country. The nutrition-sensitive fish agri-food systems approach developed in Bangladesh, has been identified as means to improve fish stock and consumption in Zambia. Pond polyculture technology, with large fish and small fish stocked in the same pond, were trialled for scaling up in the Northern Province of Zambia.
- Indonesia – Strong national sectors drive the aquaculture and fisheries production for urban markets and exports, and yet areas with marginalized, poor rural populations and fisheries resources exist. This project was aimed at engaging partners to advocate for scaling up of the nutrition-sensitive fish agri-food systems approach for strengthening efforts to improve nutrition, especially for poor women and children.



The overall goal of the project is to improve nutrition and livelihoods of poor, rural households in aquatic-agricultural systems in Cambodia, Zambia and Indonesia through increased intakes of micronutrient-rich small fish and vegetables from own production, as well as through increased household income.

The objective of the project was to scale up the nutrition-sensitive fish agri-food systems approach in targeted communities in selected countries. Specifically, the objectives of the project are:

- To improve production and productivity of household pond and dykes using innovative technologies that include small fish and carps in ponds, and micronutrient-rich vegetables on dykes and in homestead gardens;
- To increase small fish production and fish species diversity in wetlands through sustainable management and enhanced stocking of micronutrient-rich small fish;
- To conduct SBCC to increase consumption of micronutrient-rich small fish and vegetables, especially in women and children;
- To improve gender equality and women's empowerment; and
- To develop partnerships through regional institutions to adopt and disseminate the nutrition-sensitive fish agri-food systems approach.

Four outcomes were identified from the project and are as follows:

- Increase availability, access and consumption of micronutrient-rich small fish and vegetables in targeted population groups in the selected countries;
- Improved gender equity and women's empowerment, especially regarding intra-household food intake, agricultural practices and work load;
- Increased knowledge, awareness and training of government, national and NGO partners in nutrition-sensitive fish agri-food systems approach for influencing policies and implementing interventions for scaling up; and
- Strong regional and national partnerships and collaboration for adoption and dissemination of the nutrition-sensitive fish agri-food systems approach.

## **II. IMPLEMENTATION PROGRESS:**

### **A. Project expenditure (EUR) by year**

	Year 1 (reporting period)	Year 2 (reporting period)	Year 3 (reporting period)	Total
Yearly budget	732,804	642,716	590,276	1,956,796
Funds received each year	291,942	553,571	608,934	1,454,447
Yearly Expenditures	540,465	537,428	389,833	1,467,726
Balance by year	(248,523)	16,143	219,101	(13,279)

### **B. Brief comments on advances from IFAD, expenditures and pre-financing**

The grant agreement between IFAD and WorldFish (EUR 1,956,796) was signed on 24<sup>th</sup> May 2016, the official starting date of the project, and the first tranche of funding was received on 14<sup>th</sup> December 2016. This was one month before the first financial reporting period (24<sup>th</sup> May 2016 – 31<sup>st</sup> December 2016). There was very limited pre-financing in this 6-months period, this is why the expenses without cost sharing (2%) covered were only EUR 33,269.

### **C. Monitoring and evaluation arrangements**

The monitoring and evaluation of the project is embedded within the CGIAR Research Program (CRP) on Fish Agri-food Systems (FISH). The CGIAR Monitoring, Evaluation and Learning (MEL) platform was used to track project indicators to assess progress towards objectives and targets as outlined in the project.

The indicators set in the logical framework was refined to effectively capture the desired outcomes and outputs as outlined in the project document.

### **D. Physical progress by output against targets**

## **Component 1: Increased availability, access and consumption of micronutrient-rich small fish and vegetables in targeted population groups in the selected countries**

### **Output 1: Increase in fish production from household ponds, rice field ponds and vegetable production from pond dykes and homestead gardens**

In Cambodia, the nutrition-sensitive fish agri-food systems approach was implemented in three rural areas of Cambodia (Battambang, Siem Reap and Pursat) and was successfully trialled for two production cycles from 2017 to 2019. In the first production cycle of 2017/18, we successfully established pond polyculture in 65 homestead ponds and 15 rice field ponds, reaching out to a total of 80 households. We also managed to establish 73 vegetable gardens to complement the food system. In the second production cycle (2018/2019), we saw a dramatic increase in the number of ponds and gardens implemented through this approach. 264 homestead ponds and 39 rice field ponds were selected for pond polyculture, and all 303 households were provided assistance in complementary horticultural activities. In the second production cycle, the density of small fish was increased and the species assemblages were modified based on the feedback from the beneficiaries and on market demand.

Homestead ponds produced an average of 78.5 kg fish, out of which 4.4 kg was micronutrient-rich small fish, whereas rice field ponds produced an average of 87 kg fish, out of which 3.5 kg was small fish. The average vegetable production per household was 73.5 kg/year. Six months monitoring from the 143 households involved showed an increase of production from 323 kg to 528 kg, or 172% increase in vegetable production within this period.

In Zambia, 20 households were selected from villages in Luwingu, Northern Province, as participants in the pond polyculture project. The 20 ponds were stocked with four to five different fish species. Small fish were stocked from nearby sources and partially harvested throughout the growth period for consumption and sale. Between September 2019 and March 2020, 118.98 kg of small fish were harvested, from which 80.5 kg was consumed and 38.48 kg was sold. 53.86 kg of the 58.50 kg consumed by women was during the fish ban (1<sup>st</sup> December 2019 – 1<sup>st</sup> March 2020), when availability and consumption of fish from vendors and the wild was greatly reduced.

### **Output 2: Increase in small fish species diversity**

In Cambodia, homestead ponds were traditionally stocked with large fish species such as carp and silver barb. At the initial stage of this project, WorldFish promoted pond polyculture with the following composition: 55% silver barb (*Barbonymus gonionotus*), 20% silver carp (*Hypophthalmichthys molitrix*) and 20% of common carp (*Cyprinus carpio*). Nutrient-rich small fish were added at the density of 500 g/100 m<sup>2</sup> of pond area. During the second cycle of production, the fish assemblages were modified due to low market demand for common carp. Ponds were

stocked with silver barb, snakeskin gourami (*Trichopodus pectoralis*) and tilapia (*Oreochromis* spp.). Siamese mud carp (*Cirrhinus siamensis*) were included in several ponds. Small fish density was also increased to 1 kg/100 m<sup>2</sup> of pond area.

In Zambia, tilapia (*Tilapia rendalii*) was purposefully stocked in two out of the 20 ponds, and was discovered to have thrived in all the other ponds. The growth rate of *T.rendalii* was greater in comparison with the other tilapias found (*Oreochromis macrochir* and *T. sparmanii*). Two species of small indigenous fish, *Barbus trimaculatus* and *Pseudocrenilabrus philander* were stocked in these ponds for pond polyculture intervention purposes.

## **Component 2: Improved gender equity and women's empowerment, especially regarding intra-household food intake, agricultural practices and work load**

### **Output 1: Women in targeted households reporting greater decision making**

In Cambodia, local partners were trained on family visioning and planning since 2017, and in turn, these partners have trained 71 and 114 households in family visioning and planning strategies in 2018 and 2019 respectively. In addition, one training session was carried out on gender and women empowerment in 2018, and this increased to 21 training sessions in 2019. 173 participants were trained in this workshop, of which 117 of them were women.

In 2018, 212 out of 227 (93.4%) of cash transactions related to marketing fish from homestead ponds were performed by women, cumulating a total of KHR 9.7 million for 65 households and an average of KHR 150,000 managed by women. A similar trend was noticed with women from rice field ponds whereby all the transactions were managed by women, generating an average of KHR 394,000 per household. The income generated vegetable marketing was KHR 0.38 million and approximately 70% of the said income and transactions were managed by women.

In 2019, 308 cash transactions related to fish marketing were made, out of which 301 of these transactions involved women. The value generated during these transactions are estimated to be about KHR 25 million. Income generated from vegetable marketing was approximately KHR 0.32 million per household, out of which 58% of this income are directly managed by women.

In Zambia, with the exception of pond management and decision making, which was equal between both genders, 35.14% and 37.14%, respectively, women were responsible for more aquaculture activities than men and households where the responsibility is shared by both husband and wife.

### **Output 2: Project staff trained on gender equity**

In Cambodia, all project and partner staff were trained on gender equity, to ensure that the project is implemented with intention to ensure equitable participation by women in nutrition-sensitive fish agri-food systems approaches. A similar effort was undertaken in Zambia, whereby project staff were trained to educate and empower women to gain better participation in the project components.

### **Component 3: Increased knowledge, awareness and training of government, national and NGO partners in nutrition-sensitive fish agri-food systems approach for influencing policies and implementing interventions for scaling up**

#### **Output 1: 3 policy briefs and 1 plan of action for each selected country developed**

This output was revised during the project implementation period for two policy briefs for Zambia and three for Indonesia. The draft policy briefs for Zambia were presented in a workshop held in February 2020, whereby stakeholders and interested parties were invited to attend and contribute to the development of the briefs. The policy briefs for Indonesia were not presented as the workshop was postponed due to the COVID-19 pandemic.

#### **Output 2: 1 national workshop held in each of the selected country**

Two workshops were successfully held whereas one was postponed due to the COVID-19 pandemic. The workshop in Cambodia was held in December 2019 and the Zambian workshop was held in February 2020. The Indonesian workshop was planned to be held in March 2020, but was put on hold due to the global outbreak of COVID-19.

On December 4<sup>th</sup> 2019, WorldFish and FiA organized a final workshop in Phnom Penh. The workshop was divided into a morning and an afternoon session related to lessons learned and recommendations. The afternoon session included NGO partners. The workshop provided the opportunity to present and discuss results of project activities. The afternoon session involved 27 stakeholders from four main groups: 4 Fisheries Administration Cantonment Officers; 15 farmers (beneficiaries of the project) and hatcheries operators, and 8 NGO partners.

Another international workshop was held on 24<sup>th</sup> and 25<sup>th</sup> February, 2020, in Lusaka, Zambia, as part of the outputs to the project. The workshop was organized with the intention to promote better awareness and adoption of the nutrition-sensitive fish agri-food systems approach in Zambia, while exploring opportunities for establishing partnership for scale up in other regions of Zambia and Africa. Sixty-six people, from various institutions such as donor agencies, government offices, research institutions, local and international NGOs, project farmer and representatives from the private sector, participated in the workshop.

#### **Component 4: Strong regional and national partnerships and collaboration for adoption and dissemination of the nutrition-sensitive fish agri-food systems approach**

##### **Output 1: Partnership agreements signed and plans of action agreed upon**

In Cambodia, an international workshop with partners was held on 3<sup>rd</sup> December 2019, with attendance of 68 participants, comprising of NGO representatives, donor and development agencies, students and representatives of universities, government officials, private sector representatives, as well as project farmers and WorldFish staff. The workshop was also attended by a delegation from Africa, comprising representatives from Malawi, Ghana, Kenya and Côte d'Ivoire, and another delegation from Assam, India.

In Zambia, a workshop was held in late February 2020 and had generated significant interest in the nutrition-sensitive fish agri-food systems approach as means to address malnutrition while strengthening the fisheries and aquaculture sector in Zambia. Following the workshop, WorldFish had dialogues with different stakeholders, including the Ministry of Health of Zambia, the Indaba Agricultural Policy Research Institution (IAPRI), and CSO-SUN to scale up the approach. GIZ also organized a subsequent field visit to the project site in Luwingu, Northern Province, to learn and replicate similar approaches in Luapula.

##### **Output 2: Global and regional policy briefs and plans of action developed**

Two policy briefs were developed to advocate the adoption and scaling of nutrition-sensitive fish agri-food systems approach in Zambia, titled:

- a. Micronutrient-rich Small Fish for Nourishing the Northern Province, Zambia; and
- b. Pond polyculture in Northern Zambia: Improving Nutrition and Livelihoods

#### **E. Progress by Outputs realized since the submission of previous report**

**All activities here are reported for the period from 1<sup>st</sup> January 2020 to 31<sup>st</sup> March 2020.**

#### **Component 1: Increased availability, access and consumption of micronutrient-rich small fish and vegetables in targeted population groups in the selected countries**

##### **Output 1: Increase in fish production from household ponds, rice field ponds and vegetable production from pond dykes and homestead gardens**

The field activities of the project in Cambodia ended in November 2019 and the progress was reported in the 2019 report submitted to IFAD.

In Zambia, the final sampling and endline study took place in March 2020 due to unforeseen delays due to national security in Zambia. The final sampling showed that between September 2019 and March 2020, 118.98 kg of small fish were harvested, from which 80.5 kg was consumed and 38.48 kg was sold. 53.86 kg of the 58.50 kg consumed by women was during the fish ban (1<sup>st</sup> December 2019 – 1<sup>st</sup> March 2020), when availability and consumption of fish from vendors and the wild were greatly reduced.

#### **Output 2: Increase in small fish species diversity**

There has been no change in species diversity of small fish since last reported.

### **Component 2: Improved gender equity and women's empowerment, especially regarding intra-household food intake, agricultural practices and work load**

#### **Output 1: Women in targeted households reporting greater decision making**

No workshops or training sessions were held in Cambodia and Zambia since 2019. However, from the endline study conducted in Zambia in March 2020, the number of project farmers had grown from 14 to 29, and is expected to grow to 50 women participants after the end of study. Several women from the initial phase of the project had come together to form a cooperative to establish a seedling and stocking pond in order to further promote pond polyculture in Zambia.

#### **Output 2: Project staff trained on gender equity**

No training were conducted since the last report. In Zambia, project farmers from the initial phase were trained to be resource advocates for promoting pond polyculture and micronutrient-rich small fish in the villages of Luwingu, Northern Province.

### **Component 3: Increased knowledge, awareness and training of government, national and NGO partners in nutrition-sensitive fish agri-food systems approach for influencing policies and implementing interventions for scaling up**

#### **Output 1: 3 policy briefs and 1 plan of action for each selected country developed**

Two policy briefs drafted for Zambia was presented for stakeholders consultation in a workshop held in February 2020. The policy were revised and drafted, and is currently under review from partner agencies before launching it across WorldFish platforms.

#### **Output 2: 1 national workshop held in each of the selected country**

An international workshop was held in Cambodia in December 2019, and was reported in the 2019 progress report. An international workshop was held in Lusaka, Zambia, in February 2020 and the report is currently under review by partner and country offices before public dissemination.

A separate workshop was held in Malawi in late February to scale up the nutrition-sensitive fish agri-food systems approach, and to explore the opportunities of engagement with partner organizations based in Malawi.

**Component 4: Strong regional and national partnerships and collaboration for adoption and dissemination of the nutrition-sensitive fish agri-food systems approach**

**Output 1: Partnership agreements signed and plans of action agreed upon**

No partnership agreements were signed during this period.

**Output 2: Global and regional policy briefs and plans of action developed**

A study was conducted to evaluate the market value and demand of small fish in Cambodian markets from January to March 2020. The results of the study is currently reviewed and structured for a strategic action plan to further promote small fish for consumption in Cambodia.

**F. Difficulties encountered and measures taken/plans to resolve problems**

In Cambodia: The project was carried out smoothly with very little difficulties, as it was built upon existing partnerships and presence of WorldFish in Cambodia. The main difficulties faced during the project implementation is the movement of staff and language barriers, but these were resolved immediately with the appropriate recruitment and engagement of local partners in the project.

In Zambia: The project suffered from delays since its inception due to unforeseen staff movements. However, this was quickly resolved through the recruitment of interns for WorldFish to implement the pilot projects in Northern Province, Zambia. The interns were supported with partnerships from Peace Corps and the Department of Fisheries, overcoming issues such as language, communication and personal safety. The pond polyculture pilot were faced with several issues including high mortality rate during transfer, and the ownership and management of ponds by the households. The issue with mortality rates were addressed through proper acclimatization techniques, allowing the fish to adapt and build resilience to shock before they were transferred from stocking ponds to project ponds. Two ponds were surrendered by the women to the men of the households due to cultural norms, and were omitted from the final survey and results.

Globally, the COVID-19 pandemic that started in December 2019 and continued in March 2020 affected several components of the project, including a major stakeholders' workshop in Indonesia, and the engagement for policy briefs with Indonesian counterparts. The global lockdown had also hindered movements across borders locally and regionally, hence had affected on-site engagements with farmers in Zambia.



### **III. INNOVATIONS** *(If applicable and their adoption)*

- *A process that adds value or solves a problem in new ways. To qualify as innovation, a product, idea or approach needs to be new to its context of application. The novelty may refer to country context, scale, domain, discipline or line of business.*

This project is designed with the objective to scale up the nutrition-sensitive fish agri-food systems approach, piloted successfully in Bangladesh, to other countries in Southeast Asia and Africa. This approach uses fish as an entry point to address issues of malnutrition while improving livelihoods of poor, rural households engaged in aquatic agricultural systems in Cambodia, Zambia and Indonesia. Two pathways, namely to introduce pond polyculture in traditional aquatic food systems and the increased consumption of micronutrient-rich small fish, were taken as interventions as part of the approaches. Other pathways that were employed included the integration of vegetable and fish production systems within the household, training on hygiene, gender equity and youth empowerment.

The pond polyculture system is effective to improve production and productivity within an established pond. Micronutrient-rich small fish were sourced from local water bodies and stocked in the same pond with fish grown for commercial uses. As small fish and cultured fish occupy different niches within the habitat as there are no reports of competition and negative effects of growth of either types of fish within the same pond. Micronutrient-rich small fish were partially harvested in between seasons for consumption within the households hence enhancing the nutrient availability and dietary diversity for the members of the household. Large fish produced from the ponds were sold and the income generated allows for better nutrition planning for the household.

### **IV. INTERNATIONAL PUBLIC GOODS** *(Number of publications, new seed varieties etc.)*

- *All publications in preparation, submitted or in press to be mentioned under this section and a list & related links to be provided in the annexes.*
- *Seed varieties developed and made available to the scientific community and others. (reference to the gene bank and access modalities).*
- WorldFish is committed to publish the two policy briefs for Zambia in 2020. The draft documents were circulated to partners and stakeholders for refinement and feedback.
- WorldFish is further producing a working paper on nutrient-rich fish products in Zambia and Malawi, a proceedings from the international workshop in Zambia and three blog articles to promote the visibility of the project.
- A factsheet was developed by WorldFish for nutrition-sensitive fish agri-food systems in Cambodia in 2017 and is used as education and information dissemination tool to promote pond polyculture there.

### **V. GENDER ISSUES**

- *Highlights how the project has integrated or addressed gender/women's empowerment issues.*
- This project was designed with the specific objective of improving gender equity and women empowerment as a desired outcome.
- Women were trained in Cambodia and Zambia to take ownership of ponds, manage the production of fish and vegetables from the systems, and the management of income to improve dietary diversity and distribution within the household
- Pregnant and lactating women were also given training and empowerment to include small fish as part of their diets, and fish powder as a complementary food for children.
- Aside from project farmers, gender awareness and equity is also promoted within project staff and is reflected in training and workshop sessions, whereby at least 40% of the participants were women.

## **VI. YOUTH ISSUES**

- *Highlights how the project has integrated or addressed issues related to the creation of opportunities for youth.*
- The project has targeted youth as beneficiaries and were trained in pond management, harvesting and processing small fish into fish products. Youths were also indirectly engaged through the employment by project farmers in Zambia to assist with the establishment and maintenance of the ponds.

## **VII. CLIMATE AND ENVIRONMENT**

- *Highlights how the project addresses environmental and climate issues.*
- This project did not identify climate and environmental impacts as its direct objectives through the implementation of the project. However, the introduction and implementation of pond polyculture in homestead ponds are seen as ways to promote a circular economy within the production systems. Food and kitchen waste is used as fish feed within these homestead ponds, while the pond water is used to supplement and irrigate the vegetable plots by the ponds.

## **VIII. NUTRITION FOCUS**

- *Looks at how the project integrated nutrition in its implementation.*
- This project utilized micronutrient-rich small fish as an intervention to increase dietary diversity, availability and access of nutritional foods by households in rural areas of Cambodia and Zambia. These micronutrient-rich small fish are sourced from local water bodies and cultivated in homestead ponds or rice field ponds, alongside with commercial aquaculture species such as tilapia and carp species. These small fish species were partially harvested throughout the production cycle, enabling easier inclusion of fish in the household diets. Small fish also makes for

more equal distribution of animal-source food within the household, as compared to distribution of large fish, which was traditionally reserved for the head of the household and men.

- Small fish provide high amounts of bioavailable micronutrients as they are usually consumed whole, including head and bones. Thus, this project also aimed to mainstream small fish as part of the diet of women and children, especially those within the first 1,000 days of life. In Cambodia, a pilot partnership with Vissot Co. Ltd. had resulted in the processing of small fish into fish powder and developed into a complementary food. The fish powder wafer was also acknowledged as means of addressing malnutrition in children in Cambodia.

## **IX. KNOWLEDGE MANAGEMENT**

- *This section should look at how KM is used to improve the project's own performance; how lessons are extracted and shared and preserved including production of relevant knowledge products, exchange visits, ICT systems etc.*
- This project was developed to scale the nutrition-sensitive approaches implemented in Bangladesh to other countries such as Cambodia and Zambia. Three workshops were organized, with one postponed due to the COVID-19 pandemic, to facilitate the exchange of knowledge and expertise with participating country partners, and potential partners from other interested countries.
- Exchange visits were also organized to Penang, India and Japan to learn about technologies, skills and systems to facilitate the implementation of pond polyculture and nutrition-sensitive approaches in target countries.
- In-country training were conducted in Cambodia and Zambia to impart knowledge and skills to partners such as extension officers from Department of Fisheries, Peace Corp volunteers and project farmers to implement the project. Other training included topics of hygiene and gender empowerment were also conducted.

## **X. SCALING UP POTENTIAL**

- *This looks at the efforts being put in place to expand or replicate the programme in the future, and the sustainability of the project.*
- Through this project, WorldFish had proposed scale up measure in several other countries including Myanmar, Malawi, Ghana and Kenya. Discussions were held to develop integrated fish-rice production systems in deltas of Myanmar and Bangladesh. A project proposal was also submitted to develop integrated fish-rice-vegetable food systems in Ghana and Kenya to IFAD, and WorldFish will be initiating the project in late 2020/early 2021.
- In Zambia, discussions were held with GIZ and JICA to scale up the project in other regions including Luapula. GIZ had a field visit to the project in Luwingu in March, and is expected to have further discussions

to explore potential for scale up in the future, in Zambia as well as in other countries, including Malawi.

## **XI. PARTNERSHIPS**

- *Describe all the typologies of partnerships: Government, NGO, Academic institutions etc. and how they are collaborating with the project.*
- WorldFish partnered with the Fisheries Administration (FiA) of Cambodia to provide training to NGO technicians to monitor fish culture and provide technical support to local farmers involved in the project. Through this partnership, 1,433 visits were conducted to 270 farmers involved in the project.
- Horticulture activities in Cambodia were conducted in collaboration with the Rice Field Fisheries II project funded by USAID, whereby households for the second cycle were selected from the communities in this project to create synergies and facilitate easier monitoring and capacity building.
- WorldFish partnered with Vissot Co. Ltd., a private company involved in developing health food, to develop a fish powder wafer as means to incorporate micronutrient-rich small fish into the diet of children to combat malnutrition.
- In Zambia, the pond polyculture project was done in collaboration with the Department of Fisheries, and their extension officers in Luwingu. These officers facilitated the development of ponds, sourcing of seeds and monitoring the pond developments in the communities.
- Partnership was also established with Peace Corps, whereby, the volunteers worked together with WorldFish staff to develop information materials and conduct training sessions with the project farmers.
- In Indonesia, WorldFish was working with officers from the Ministry of Maritime Affairs and Fisheries (MMAF) to develop policies that introduces micronutrient-rich small fish into the fish production systems of rural communities in Indonesia.

## **XII. EC VISIBILITY ACTION** *(attach documentation/links to videos/articles)*

- Global workshop on Nutrition-sensitive Fish Agri-food Systems held in Siem Reap, Cambodia, in 2017 is documented and published on WorldFish website:  
<https://www.worldfishcenter.org/global-workshop-nutrition-sensitive-fish-agri-food-systems>
- Blog on Nutrix fish wafer, a product developed by Vissot Co in Cambodia using small fish obtained from partnership with farmers from this project in Siem Reap:  
<http://blog.worldfishcenter.org/2020/03/nutrix-the-big-reach-of-small-fish-in-nourishing-cambodia/>
- Blog on partnership with Peace Corps volunteers in implementing nutrition-sensitive pond polyculture in Luwingu, Zambia:

<http://blog.worldfishcenter.org/2020/06/implementing-nutrition-sensitive-pond-polyculture-in-zambia-worldfish-teams-up-with-peace-corps-volunteers/>

- Factsheet developed by WorldFish on the project implementation in Cambodia:  
<https://www.worldfishcenter.org/content/managing-aquatic-agricultural-systems-improve-nutrition-and-livelihoods-cambodia-0>
- Two videos developed and uploaded onto our social media platforms:  
Small fish, big benefits for Cambodia's rural communities:  
<https://www.facebook.com/watch/?v=370503400340751>  
Nutrition education for a brighter future in Cambodia:  
<https://www.facebook.com/watch/?v=759187677812016>

## CONCLUSIONS

- *Include an outline of the work plan for the activities that will be implemented during the next reporting period.*
- *(For project-completion/final reports define the magnitude and where possible the impact of the project).*

The three year project comes to a close on 31<sup>st</sup> March 2020, with successful results and significant transformations across aquatic-agricultural landscapes in Cambodia and Zambia. Through this project, households in rural Cambodia were given the opportunity to integrate micronutrient-rich small fish into limited water bodies such as homestead ponds and rice-field ponds, hence increasing the availability to and accessibility of fish as part of the household diets. The trainings conducted through this project successfully raised awareness on several key issues including the importance of micronutrient-rich small fish in combatting malnutrition; women and youth's ability to affect change through aquaculture management; and diversification and management of income to improve dietary diversity and security within the households. This is further reflected through success innovations such as the incorporation of fish powder into a snack for complementary feeding in Cambodia, and the establishment of women cooperative to stock and distribute small fish seedlings in Zambia. The COVID-19 pandemic had affected the project implementation in Indonesia, as the stakeholder's consultative workshop to review and refine the policy briefs developed for Indonesia was postponed indefinitely. This had further delay efforts to introduce and implement nutrition-sensitive fish-agri food systems in rural communities and households in Indonesia.

## Annex 1: International Public Goods

- *Abstracts of papers under preparation (in relation to the programme).*
- *List of publication.*
- *List of International Workshops attended and Papers presented.*
- *Websites.*
- *Etc.*

### Publications (In pipeline):

- Policy brief for Zambia 1: Micronutrient-rich small fish for nourishing the Northern Province, Zambia (*Review of draft by partners*)  
Summary:  
Micronutrient-rich small fish has the potential to address the malnutrition problems prevalent in the Northern Province of Zambia; especially for the essential growth and development of a child during the first 1,000 days of life. Nutrition-sensitive fish agri-food systems approach may improve the production, consumption, availability and accessibility of the micronutrient-rich small fish to the communities while improving food and nutrition security, dietary diversity and livelihoods in the Northern Province.
- Policy brief for Zambia 2: Pond polyculture in Northern Zambia: Improving nutrition and livelihoods (*Review of draft by partners*)  
Summary:  
Pond polyculture, the practice of culturing more than one species of fish within the same pond, could be effective as a method of increasing the production and consumption of micronutrient-rich small fish in rural households. These micronutrient-rich small fish have the potential to improve dietary diversity and nutrition access within households without compromising income generation and livelihoods
- Nutrient-rich foods to improve dietary quality in the first 1,000 days of life in Malawi and Zambia: Formulation, processing and sensory evaluation – working paper (review by WorldFish)

### Published papers:

- Factsheet developed by WorldFish on the project implementation in Cambodia:

<https://www.worldfishcenter.org/content/managing-aquatic-agricultural-systems-improve-nutrition-and-livelihoods-cambodia-0>

### List of workshops:

- a. Global Workshop on Nutrition-sensitive Fish Agri-food Systems – 5-8 December 2017: <https://www.worldfishcenter.org/global-workshop-nutrition-sensitive-fish-agri-food-systems>
- b. Small Fish for Nutrition Final Workshop – 3 December 2019: <https://www.worldfishcenter.org/events/small-fish-nutrition-final-workshop>
- c. Nutrition-sensitive Fish Agri-food Systems in Zambia Workshop – 24 -25 February 2020 : <https://www.worldfishcenter.org/events/nutrition-sensitive-fish-agri-food-systems-zambia-workshop>