



## Event Report

# Cross-learning exposure visit from Cambodia to India

Odisha and Assam, India

August 2023



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## About WorldFish

WorldFish is a nonprofit research and innovation institution that creates, advances and translates scientific research on aquatic food systems into scalable solutions with transformational impact on human well-being and the environment. Our research data, evidence and insights shape better practices, policies and investment decisions for sustainable development in low- and middle-income countries.

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

Our research and innovation work spans climate change, food security and nutrition, sustainable fisheries and aquaculture, the blue economy and ocean governance, One Health, genetics and AgriTech, and it integrates evidence and perspectives on gender, youth and social inclusion. Our approach empowers people for change over the long term: research excellence and engagement with national and international partners are at the heart of our efforts to set new agendas, build capacities and support better decision-making on the critical issues of our times.

WorldFish is part of One CGIAR, the world's largest agricultural innovation network.

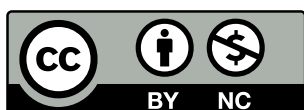
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Sourabh Kumar Dubey

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## List of acronyms

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ACS	Assam Civil Service
APART	Assam Agribusiness and Rural Transformation Project
BMZ	German Federal Ministry for Economic Cooperation and Development
CFR	Community Fish Refuges
CIFA	Central Institute of Freshwater Aquaculture
FIA	Fund International Agricultural Research
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Agency for International Cooperation)
GP	Gram Panchayat
IAS	Indian Administrative Service
ICAR	Indian Council of Agricultural Research
NFDB	National Fisheries Development Board
SIS	Small indigenous fish species
WSHG	Women Self-Help Group

# 1. Executive summary

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- With financial support from the German Federal Ministry for Economic Cooperation and Development (BMZ), WorldFish is executing the project titled "Taking Nutrition-Sensitive Carp-SIS Polyculture Technology to Scale." Within this initiative, WorldFish has successfully developed scalable mass production techniques for small indigenous fish species (SIS) seeds in the Indian states of Odisha and Assam.
- In the context of Cambodia, the implementation of a hatchery-based production protocol is imperative for the sustainable development of inland open water ecosystems and, consequently, the enhancement of small fish production and consumption. Recognizing this need, a distinguished four-member Cambodian delegation embarked on an exploratory mission to delve into the mass seed production of various SIS in India.
- This enlightening exposure visit unfolded in the states of Odisha and Assam from 21 August to 29 August 2023. The initiative was conducted in collaboration with the Fisheries and Animal Resources Development Department of the Government of Odisha and the Department of Fisheries of the government of Assam.
- The primary objective of this cross-learning exposure visit was to unravel the intricacies of mass seed production of SIS. Additionally, the delegation sought to comprehend the roles played by government and research institutions in promoting a nutrition-sensitive aquaculture approach. The visit also aimed at fostering cross-learning experiences related to rice field fisheries, Community Fish Refuges (CFRs), and wetland management in Cambodia.
- Throughout this comprehensive week-long visit, the Cambodian delegates have been exposed to a myriad of essential processes within the hatchery-based induced breeding protocol and seed rearing. This comprehensive exposure ranges from broodstock collection and hormonal manipulation to exploring the life cycle of SIS and nursery rearing protocols.
- Additionally, the delegation has embarked on a remarkable journey to witness the Women Self-Help Groups (WSHG) managed ponds in Odisha.
- The visit also encompassed interactions with renowned national research and extension institutes, such as ICAR-Central Institute of Freshwater Aquaculture (ICAR-CIFA) and National Fisheries Development Board (NFDB).
- A noteworthy highlight of the visit was the exchange of ideas with the Department of Fisheries in both the Odisha and Assam governments. This collaborative dialogue served as an opportunity to mutually share and co-exchange fisheries-related activities, fostering a spirit of cooperation between the two nations.

## 2. Introduction

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India is currently grappling with a substantial developmental hurdle manifested in the form of undernutrition. Fish, renowned for its abundant protein, micronutrients, vitamins, and essential omega-3 fatty acids, stands out as an indispensable resource that proves challenging to replace with alternative food sources. Particularly in states such as Assam and Odisha, where a significant number of women, men, and children contend with undernourishment, fish play a critical role in combating malnutrition. Indigenous small fish species, referred to as SIS, are hailed as "superfoods" due to their markedly higher micronutrient levels compared to commonly farmed carp species like rohu and catla.

At the forefront of championing "Nutrition-sensitive aquaculture," WorldFish advocates for the production of micronutrient-rich SIS alongside traditional carp farming. SIS, distinguished by their diminutive size (less than 25 cm in standard length) and natural freshwater origin, face a decline in availability across India due to factors such as resource degradation, overexploitation, pollution, and climate change. Once abundant and economical, certain SIS are now becoming scarce and costly.

Mola (*Amblypharyngodon mola*) is exemplary species for nutrition-sensitive initiatives. They boast an abundance of vital micronutrients, including calcium, zinc, and vitamins A and B12, offering significant contributions to human nutrition and health, particularly for women and children. WorldFish has actively promoted nutrition-sensitive carp-mola farming in Odisha, Assam, and Bangladesh over the past decade, aiming to foster SIS production for household consumption and income generation.

WorldFish's prior research indicates that incorporating SIS in carp polyculture increases the consumption of micronutrient-rich small fish by women and children, presenting a cost-effective strategy to mitigate malnutrition. However, the lack of standardized hatchery-based mass production of mola seed has impeded the widespread adoption of nutrition-sensitive aquaculture to reach a broader population.

In response to this challenge, WorldFish is executing a project titled "Taking Nutrition-sensitive Carp-SIS Polyculture Technology to Scale" in the states of Odisha and Assam in India. The Scaling SIS project, funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and commissioned by the GIZ through the Fund International Agricultural Research (FIA), aims to develop scalable mass production techniques for mola seed based on standardized protocols for hatchery-based breeding.

## 2.1 The breakthrough

In 2022, WorldFish achieved a groundbreaking milestone by introducing a simple and highly replicable technique for large-scale mola seed production. This achievement was realized through a collaborative effort with Smt. Rashmita Biswal of Biswal Aquatech, who generously provided access to her hatchery facilities in Tulunga village, Tirtol block, within the Jagatsinghpur district of Odisha.

Building on the knowledge gained in Odisha, the project team accomplished a significant breakthrough by successfully implementing induced breeding in Assam, marking a pioneering achievement for Northeast India. In 2023, the team demonstrated their capabilities by producing an impressive quantity of nearly 1 million mola and punti (*Puntius sophore*) seeds (hatchlings). This accomplishment was made possible through collaboration with Mr. Biswajyoti Sarma, the project's partner hatchery owner, who generously provided his facilities in Chotonagoan village, Pachim Mangaldai block, within the Darrang district of Assam.

Furthermore, at another partner hatchery owned by Mr. Hiradhar Sarkar in the village of Garajan, Nagaon district, the project team successfully developed a mass seed production protocol for reba carp (*Cirrhinus reba*). In addition to achieving successful breeding, the team has formulated improved management practices specifically tailored for the nurturing of SIS seeds in pond environments. This multi-faceted progress underscores the project's commitment to advancing sustainable aquaculture practices and enhancing seed production capabilities to propagate nutrition-sensitive aquaculture.

From left to right: Mr. Soth Vithun, Mr. Sok Sao, Mr. Ros Kunthy and Mr. Sean Vichet



### 3. The event: cross-learning exposure visit

Cambodia's rain-fed and flooded rice fields serve as crucial and highly productive sources of inland fisheries, particularly SIS. These aquatic resources play a vital role in the lives of millions of Cambodians, especially those residing in rural areas. Not only do they contribute significantly to rural livelihoods, but they also play a pivotal role in ensuring food security, nutrition, and income generation. This is especially noteworthy given that rice field fisheries operate as open-access resources in Cambodia.

In the context of Cambodia, the implementation of a hatchery-based production protocol is imperative for the sustainable development of inland open water ecosystems and, consequently, the enhancement of small fish production and consumption. Recognizing this need, a distinguished four-member Cambodian delegation embarked on an exploratory mission to delve into the mass seed production of various SIS in India.

This enlightening exposure visit unfolded in the states of Odisha and Assam from 21 August to 29 August 2023. The initiative was conducted in collaboration with the Fisheries and Animal Resources Development Department of the Government of Odisha and the Department of Fisheries of the government of Assam.

The primary objective of this cross-learning exposure visit was to unravel the intricacies of mass seed production of SIS. Additionally, the delegation sought to comprehend the roles played by government and research institutions in promoting a nutrition-sensitive aquaculture approach. The visit also aimed at fostering cross-learning experiences related to rice field fisheries, Community Fish Refuges (CFRs), and wetland management in Cambodia.

Sl. No.	Name	Designation
1	Mr. Ros Kunthy	Department of Aquaculture Development, Fisheries Administration, Govt. of Cambodia
2	Mr. Soth Vithun	Faculty of Fisheries and Aquaculture, Royal University of Agriculture, Cambodia
3	Mr. Sean Vichet	Provincial Coordinator, WorldFish Cambodia
4	Mr. Sok Sao	Research Fellow, WorldFish Cambodia.

**Table 1.** Details of Cambodian delegation team.



## 3.1 Cross-learning exposure visit in Odisha

### 3.1.1 Exploration of partner hatchery

The team ventured to the partner hatchery complex nestled in Tulunga village, Tirtol block, Jagatsinghpur district. During this visit, the Cambodian delegates closely observed the ongoing breeding processes at the hatchery, gaining exposure to a myriad of essential steps within the hatchery-based induced breeding protocol of mola. This comprehensive exposure encompassed activities ranging from broodstock collection and hormonal manipulation to delving into the life cycle of SIS and understanding nursery rearing protocols.

### 3.1.2 Exploration of carp-mola polyculture managed by women

The delegation visited a carp-mola polyculture in Gram Panchayat (GP) tank in Tirtol block, where the Women Self-Help Groups (WSHG) named Ma Sarala WSHG is actively managed the pond. Discussions revolved around feeding practices, disease management, harvesting strategies, and other key aspects of nutrition-sensitive aquaculture. Valuable insights were gained into the pivotal role played by grassroots institutions, predominantly led by women, in advancing nutrition-sensitive carp-SIS polyculture with government support.

### 3.1.3 Visit to ICAR-CIFA and NFDB

Furthering their exploration, the delegation visited ICAR-CIFA, a national research institution for inland aquaculture situated at Kausalyaganga, Bhubaneswar. Meaningful discussions and exchanges took place with Dr. P. K. Sahoo, Director, and Principal Scientists Dr. P. C. Das and Dr. B. R. Pillai at CIFA. The dialogue covered the fish production system of Cambodia, identifying gaps and challenges in aquaculture development, and exploring various aspects of SIS culture.

The delegation also toured the National Fresh Water Fish Brood Bank (NFFBB) within the NFDB campus. Witnessing ongoing breeding activities of various carps, they visited the facilities, and Dr. Manas Kumar Sinha, Senior Executive at NFFBB, provided detailed explanations of broodstock development, hormonal manipulation, and nursery rearing. These engagements enriched the Cambodian delegates with valuable insights into diverse fisheries development activities.

### 3.1.4 Visit to Directorate of Fisheries

During visit to the Directorate of Fisheries, Government of Odisha, the team had the privilege of meeting with Md. Sadique Alam, IAS, the Director, in Cuttack. The discussion focused on the fisheries-related initiatives undertaken by the government in both countries, in addition to exploring various government schemes aimed at promoting fisheries development. This collaborative dialogue provided a valuable platform for the exchange of ideas, enabling both nations to share insights into their respective fisheries activities and fostering a spirit of cooperation between them.

## 3.2 Cross-learning exposure visit in Assam

### 3.2.1 Exploration of partner hatchery

The team embarked on a visit to the partner hatchery complex situated in the village of Garajan, Nagaon district. Mr. Hiradhar Sarkar, the owner of the hatchery, graciously guided the team through the ongoing breeding activities of mola, providing a comprehensive explanation of the entire process. Throughout the visit, the Cambodian delegates had the opportunity to closely observe the nursery rearing protocol for reba carp. This firsthand experience allowed for a deeper understanding of the intricacies involved in the hatchery's operations.

### 3.2.2 Visit to APART project

The delegation team had the privilege of visiting the Assam Agribusiness and Rural Transformation Project (APART), a World Bank-funded initiative located in Guwahati. Dr. Sanjay Sarma, the Fisheries Coordinator at APART, delivered a detailed presentation on the current fisheries activities being carried out under the project. These activities encompassed carp-mola breeding, SIS polyculture, and the innovative rice-fish farming system.

During this insightful visit, a cross-learning exchange occurred, focusing on various aspects such as wetland fisheries, CFRs, and rice field fisheries. The engagement facilitated a valuable interchange of knowledge and experiences between the stakeholders involved.

### 3.2.3 Visit to Directorate of Fisheries

During the visit to the Directorate of Fisheries, Government of Assam, the team had the honor of meeting Mr. N. K. Debnath, ACS, the Director, along with Dr. Dhruvajyoti Sharma, Nodal Officer for the APART project and Managing Director at FISHFED. The session included a comprehensive presentation by Mr. Sean Vichet on inland fisheries and aquaculture practices in Cambodia.

The discussion delved into the fisheries-related initiatives undertaken by both countries' governments. Additionally, various government schemes aimed at fostering fisheries development were explored. This collaborative dialogue served as a pivotal platform for the exchange of ideas, particularly focusing on the development of wetland fisheries, CFR, and rice field fisheries in Assam. The engagement aimed at fostering mutual understanding and cooperation in these vital areas of fisheries management and development.

## 4. Outcomes of the event

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- This immersive exposure spanned activities from SIS broodstock collection and hormonal manipulation to exploring the life cycle of SIS and understanding nursery rearing protocols. This firsthand experience provided a profound insight into the intricacies of the mass seed production protocol for mola, punti, and reba carp.
- Valuable insights were gleaned into the crucial role played by grassroots institutions, predominantly led by women, in advancing nutrition-sensitive carp-SIS polyculture with government support.
- The collaborative dialogue with the government offered a significant platform for the exchange of ideas, allowing both nations to share insights into their respective fisheries activities and fostering a spirit of cooperation.
- This collaborative dialogue served as a pivotal platform for the exchange of ideas, with a specific focus on the development of wetland fisheries, CFRs, and rice field fisheries in Assam. The engagement aimed to cultivate mutual understanding and cooperation in these essential areas of fisheries management and development.



## 5. Photographs of the event



**Demonstration of harvested mola hatchlings at partner hatchery in Odisha.**



**Conical incubator model demonstration at partner hatchery in Odisha.**



**Visit to community pond managed by WSHGs in Odisha.**



**Private farm and hatchery visit in Odisha.**



Private farm and hatchery visit in Odisha.



Visit to ICAR – CIFA, Bhubaneswar, Odisha.



Meeting and knowledge exchange during ICAR- CIFA visit.



Visit to seed Multiplication Centre of National Freshwater Fish Brood Bank, Bhubaneswar, Odisha.



**Observing breeding activities at National Freshwater Fish Brood Bank facility, Bhubaneswar, Odisha.**



**Handhold experience at National Freshwater Fish Brood Bank Facility, Bhubaneswar, Odisha.**





**Handhold experience at National Freshwater Fish Brood Bank Facility, Bhubaneswar, Odisha.**



**Handhold experience at National Freshwater Fish Brood Bank Facility, Bhubaneswar, Odisha.**



**Meeting and knowledge exchange with the Director, Directorate of Fisheries, Govt. of Odisha.**



**Demonstration at the partner hatchery complex in Assam.**



**Demonstration at the partner hatchery complex in Assam.**



**Demonstration of nursed Reba carp fingerlings at partner hatchery farm in Assam.**



**Meeting and knowledge exchange with World Bank APART project, Govt. of Assam**



**Meeting and knowledge exchange with Directorate of Fisheries, Govt. of Assam.**

## Annex 1: Agenda of exposure visit

Date	Description	Location
21 Aug	Arrival in Bhubaneswar, Odisha state	
22 Aug	Travel to SIS partner hatchery at Jagatsinghpur district; on- farm training session, farm visit and back to Paradeep	Paradeep
23 Aug	On-farm training session at partner hatchery, visit to WSHG and back to Bhubaneswar	Bhubaneswar
24 Aug	Visit to ICAR-CIFA and NFDB fish farm and hatchery	Bhubaneswar
25 Aug	Visit to a private hatchery and meeting with Department of Fisheries Officials and wrap up meeting in Odisha	Cuttack
26 Aug	Departure from Bhubaneswar to Guwahati, Assam state	Guwahati
27 Aug	Visit to SIS partner hatchery at Nagaon district; on-farm training session, farm visit and back to Guwahati	Guwahati
28 Aug	Meeting with Department of Fisheries, World Bank APART Project Officials and wrap up meeting in Assam	Guwahati
29 Aug	Departure from India to Cambodia	

## Annex 2: Key participants and stakeholders

Sl	Name	Gender	Designation
1	Mr. Ros Kunthy	M	Fisheries Administration, Govt. of Cambodia
2	Mr. Soth Vithun	M	Royal University of Agriculture, Cambodia
3	Mr. Sean Vichet	M	Provincial Coordinator, WorldFish Cambodia
4	Mr. Sok Sao	M	Research Fellow, WorldFish Cambodia.
5	Dr. P. K. Sahoo	M	Director, ICAR-CIFA
6	Dr. P. C. Das	M	Principal Scientist, ICAR-CIFA
7	Dr. B. R. Pillai	M	Principal Scientist, ICAR-CIFA
8	Dr. Manas Kumar Sinha	M	Senior Executive, NFDB
9	Md. Sadique Alam	M	Director, Department of Fisheries, Odisha
10	Mr. N. K. Debnath	M	Director, Department of Fisheries, Odisha
11	Dr. Dhruvajyoti Sharma	M	Nodal Officer, APART Project
12	Dr. Sanjay Sarma	M	Fisheries Coordinator, APART Project
13	Mr. Saurava K Biswal	M	Hatchery partner, Odisha
14	Mr. Hiradhar Sarkar	M	Hatchery partner, Assam
15	Dr. Arun Padiyar	M	WorldFish Lead, India
16	Dr. Sourabh K Dubey	M	Project Coordinator
17	Mr. Rashmi R Das	M	Technical Coordinator
18	Mr. Kalpajit Gogoi	M	Technical Coordinator

## Annex 3: Certificate template



### **About WorldFish**

WorldFish is a nonprofit research and innovation institution that creates, advances and translates scientific research on aquatic food systems into scalable solutions with transformational impact on human well-being and the environment. Our research data, evidence and insights shape better practices, policies and investment decisions for sustainable development in low- and middle-income countries.

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