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REPORT

Promoting the importance of aquatic foods on human nutrition and public health under APART in Assam



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About WorldFish

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

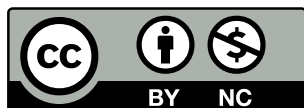
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List of abbreviations

AG	Adolescent Girls
AAU	Assam Agriculture University
ANM	Auxiliary Nursing Midwifery
APART	Assam Agribusiness and Rural Transformation Project
ARIAS	Assam Rural Infrastructure and Agricultural Services
ASHA	Accredited Social Health Activist
AV	Audio Visual
AW	Anganwadi workers
AWC	Anganwadi Centre
CGIAR	Consultative Group on International Agricultural Research
CIFRI	Central Inland Fisheries Research Institute
CRP	Community Resource Person
DoF	Department of Fisheries
DSWO	District Social Welfare Officer
ECF	Engineer Consultant Fisheries
FAO	Food and Agriculture Organization
FPC	Farmer Producer Company
FSSAI	Food Safety and Standards Authority of India
GoA	Government of Assam
GSDP	Gross State Domestic Product
ICAR	Indian Council of Agriculture Research
ICDS	Integrated Child Development Service
IEC	Information, Education and Communication
LPG	Liquid Petroleum Gas
MT	Metric Tons
NBFGR	National Bureau of Fish Genetic Resources
NFDB	National Fisheries Development Board
NFHS	National Family Health Survey
PLW	Pregnant and Lactating Women
PRI	Panchayat Raj Institutions
SBCC	Social Behavioral Change Communication
SDG	Sustainable Development Goals
SIS	Small Indigenous Species
SNP	Supplementary Nutrition Program
SOFI	State of Food Security and Nutrition in the World
TAG	Technical Advisory Group
TEF	Technical Expert Fisheries
THR	Take home Ration
ToT	Training of Trainers
UNICEF	United Nations International Children's Emergency Fund
WASH	water, sanitation and hygiene
WB	World Bank
WCD	Women and Child Development Department

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Executive Summary

The government of Assam (GoA), through the Government of India has received a loan of US\$200 million from the World Bank (WB) for the implementation of Assam Agribusiness and Rural Transformation Project (APART). The Project Development Objective (PDO) of APART is to add value and improve the resilience of selected agriculture value chains, focusing on smallholder farmers and agro entrepreneurs in targeted districts of Assam. Fish has been prioritized as one of the value chains for interventions under APART.

WorldFish, part of One CGIAR, is the knowledge partner for ARIAS to offer technical assistance to the Fisheries sub-component of the APART project over 5 years. The role of Aquatic foods contributing to food and nutrition security has been well recognized. Aquatic foods have a central role to play in transforming food systems and have immense potential to offer simple solutions to fight malnutrition and under nutrition in vulnerable communities. Aquatic foods in various forms (e.g. fresh fish, dried fish, and dried fish powder, simple fish paste products) can contribute to public health. The beneficial role of aquatic foods for pregnant and lactating mothers and children under the age of 2 years has been widely recognized globally and is being considered as a key intervention in the first 1000 days program.

One of the key activities (Deliverable 7) under the APART project is “Improving impact of aquaculture and beel fisheries on human Nutrition”. WorldFish with partners is supporting the implementation of this activity. This consolidated report summarizes all the work done by WorldFish and partners as part of deliverable 7.

The project has developed and tested several Social Behavioural Change Communication (SBCC) resources (e.g. banners, leaflets, brochures, calendars, TV spots, and videos) to promote the consumption of aquatic foods by vulnerable communities, PLM, adolescent girls, and children by targeting relevant stakeholders (e.g. Integrated Child Development Services programs, District Social Welfare (DSW) field functionaries, Anganwadi workers, Village communities, primary health centres, and the general public). We have trained 597 trainers to spread the message on the role of aquatic foods. We conducted 36 cluster-level awareness programs where 1994 numbers of women, adolescent girls and community people were given information on the benefits of fish consumption. We also organised 2 zonal workshops and 1 state-level workshop for different stakeholders to build awareness of the importance of aquatic foods. Based on the demonstrations at the community level, the project documented all the small fish-based recipes cooked locally at the community level and produced a Small Fish Recipes book.

The overall interest generated through our programs under the APART project succeeded in influencing the State Social Welfare Office to invite WorldFish and the Department of Fisheries to attend a state nutrition workshop. Also, encouraged District

Social Welfare Office, Kamrup Assam to consider conducting a pilot fish powder inclusion program in the district. The pilot program was run successfully, and the feeding program reached 293 Anganwadi Centres (AWC) with a beneficiary of around 7000 children. The local FPCs developed under the APART project were involved in producing quality and FSSAI certified dried fish powder. The model utilized local resources (nutrient dense local small indigenous fishes) and local entrepreneurs (FPCs) to develop and deliver the aquatic products (in this case dried fish powder from SIS).

The momentum built as part of this APART project activity needs to be sustained and continued. This will be possible only through integration and embedding of the lessons learned and SOPs developed in the ongoing programs and activities of departments like Department of Social Welfare and programs like ICDS in Assam. The report provides recommendations for sustaining the activities to harness the human health benefits of aquatic foods for vulnerable communities.

Introduction

Assam is the largest Northeastern state in India in terms of population and has an area of 78,438 km². The state is endowed with vast natural resources including aquatic resources suitable for fisheries and aquaculture. The vast resources include the river Brahmaputra and Barak and its tributaries with a length of 10,607.29 km. The state has majestic resources like wetlands, beels, low-lying areas, ponds etc. covering an area of 2.45 lakh hectares area. The state is rich in fish fauna with more than 380 freshwater species.

Fisheries and aquaculture play a crucial role in the socioeconomic development of the state by providing employment, nutritional and livelihood security thereby reducing poverty and promoting health. Fish Production in the state has reached a level of 3.93 Lakh MT during 2020-21 against the corresponding nutritional requirement of around 4.00 Lakh MT. The contribution of the Fishery Sector to the State's Gross State Domestic Product was Rs 5, 97,648.00 lakhs for the year 2019-20 with a growth rate of 1.49 per cent per annum over the previous year (Government of Assam 2022).



Undernutrition scenarios in India

Malnutrition contributes significantly to maternal and child mortality, decreases resistance to infectious diseases and prolongs episodes of illness, impedes growth and cognitive development, threatens resilience, and negatively impacts countries' human capital and economic growth. Hidden hunger, a micronutrient deficiency is one of the prevailing nutrition problems existing in developing countries, including India. This is mainly due to a lack of access to high-quality, nutritious food products. Child undernutrition remains a global threat, with an estimated 149 million children under the age of five years stunted, 45 million wasted (SOFI, 2022) and 340 million suffering from micronutrient deficiencies (FAO et al., 2020). In 2021, 31.9% of women in the world were moderately or severely food insecure when compared to men (27.6%).



India contributes to one-third of all the world's stunted children and half the world's wasted children. India ranks 107 out of 121 countries in Global Hunger Index (2022), which is determined by factors such as child stunting, wasting, and death. According to the National Family Health Survey-5 (NFHS-5) from 2019 to 21, 35.5% of children under the age of five had stunting, 19.3% had wasted, and 32.1% had an underweight condition. The percentage of anaemia reported to be 67.1%, 57.2% 52.2% in children of 6-59 months, non-pregnant women, and pregnant women respectively.

Undernutrition scenarios in Assam

A considerable percentage of Assam's population is under the poverty line and around 86% of its population lives in rural areas. Despite its vast resources, Assam continues to be one of the bottom five states of the country, which has continued to be having a high level of food insecurity and malnutrition. Malnutrition is a major health problem in Assam, especially in young children and PLW.

As per the NFHS-5 survey data, 35.3% of children under age 5 are stunted, 21.7% are wasted and 32.8 are underweight in Assam. The percentage of children and women suffering from anaemia has gone up in most of the backward states of India, but the situation is alarming in Assam and some other states in the northeastern region of the country. Assam has witnessed an increase in the prevalence of anaemia among children in the age group of 6-59 months and is reported to be 68.4%. Anaemia in non-pregnant women in the age group of 15-49 is 66.4% and is reported to be 54.2% in pregnant women aged 15-49 years. Both malnutrition and anaemia are high among rural women and children which is more than the national average.

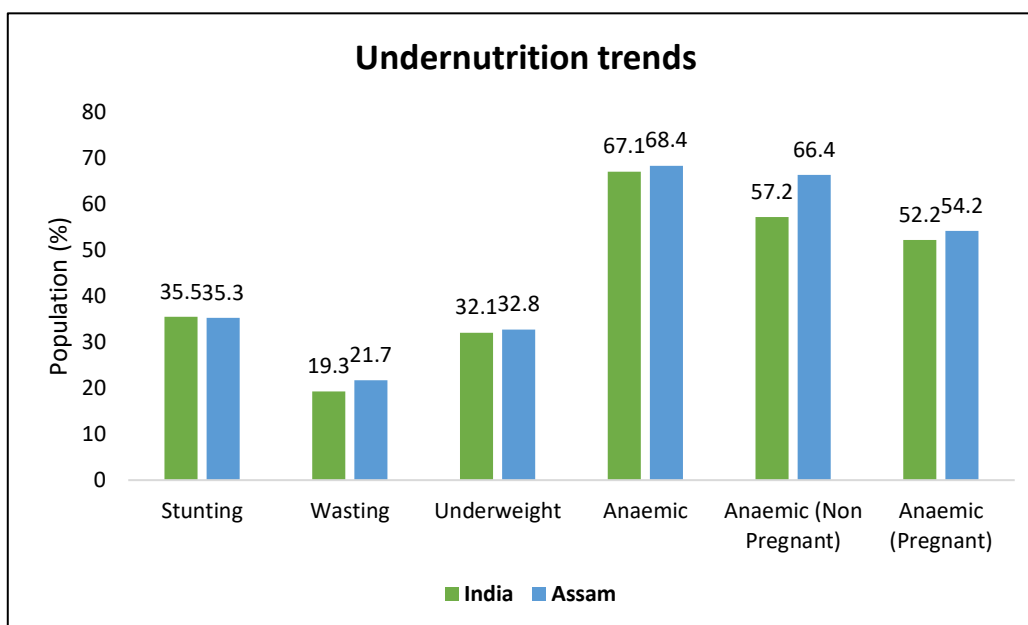


Figure 1. Undernutrition trends in Assam and India. (Source: NFHS-5).

Government Initiatives to address malnutrition

Nutrition is the key factor to achieve the agendas of Sustainable Development Goals (SDGs) 2030. The government of India as well as the government of Assam are working towards a resolution to “Transforming our world: the 2030 agenda for Sustainable Development” and recognizes the impact achievement of the goal towards improving the health and wellbeing of every citizen. Several initiatives have been taken to curb the malnutrition problem in the country.

- a. *Integrated Child Development Services (ICDS) Scheme:* This is the flagship program in India and one of the largest programs for early childhood care and development. Children under the age of five, as well as pregnant and nursing mothers, are the main beneficiaries. It serves 8.36 crore people through a network of 1,012,374 Anganwadi Centers.
- b. *Mid-day meal scheme:* It aims to improve nutrition levels among school children in addition to increasing enrolment, retention, and attendance.
- c. *Pradhan Mantri Matru Vandana Yojana:* Pradhan Mantri Matru Vandana Yojana (PMMVY) is a Centrally Sponsored DBT scheme with a cash incentive of ₹ 5000/- (in three instalments) being provided directly in the bank/post office account of Pregnant Women and Lactating Mothers.
- d. *National Nutrition Mission:* Also called “POSHAN ABHIYAN” was launched in 2018 to end malnutrition.
- e. *Anemia Mukht Bharat Abhiyan:*
Apart from these initiatives, states are taking various actions towards curbing malnutrition through different schemes and programs.

Role of aquatic foods to address malnutrition

Aquatic foods, especially aquatic animals which include finfish, shellfish, aquatic plants, aquatic weeds and other aquatic foods have long been valued as a rich source of animal protein and, therefore, considered a key constituent of nutritious diets (FAO, 2012). Fish is the cheapest source of animal protein with a valuable source of protein, macro and micronutrients and provides about 3.3 billion people with almost 20% of their average per capita intake of animal protein.

Small indigenous fishes for human health

Fish has been an important part of the human diet in almost all countries of the world. In India, a total of 765 native freshwater fish species are documented, out of which about 450 are categorized as small indigenous fish species. The northeast region of India has the maximum diversity of SIFs. Based on the assessment of NBFGR, about 23% of species of the Small Indigenous fish Species (104 species) are commercially important as food fish (62 species) and ornamental fish (42 species).

Fish, especially small fish eaten whole, are a highly nutritious animal-source food which contributes a wide range of micronutrients that benefit the health of women and children (HLPE, 2014; Kawarazuka and Béné, 2011). New evidence shows that fish consumption is associated with children having higher IQ points due to better brain development (Hibbeln et al., 2019) and lower rates of stunting due to better overall health and growth (Headey, Hirvonen, & Hoddinott, 2018) meaning that fish is a highly nutritious food for pregnant and lactating women and children. Furthermore, because fish have a lower environmental footprint compared to many other animal-source foods, experts also recommend fish as a sustainable food that is healthy for both the planet and human health (Troell, Jonell, & Crona, 2019)

Small fish can be an excellent source of micronutrients such as vitamin A, zinc, iron, and calcium, especially when consumed whole including, eyes, head and bones. When it is combined with vegetables will boost dietary diversity and enhances the bioavailability of minerals in plant-source foods (Barré et al., 2018). Small fish such as mola (*Amblypharyngodon mola*), dhela (*Osteobrama cotio cotio*), darkina (*Esomus danricus*) and kaski (*Corica soborna*) contain a high amount of vitamin A and other micronutrients and minerals (Thilsted et al. 1997). It is reported that vitamins and minerals available in one kg of SIFs are equal to those available in approximately fifty kilograms of big fish, such as Indian Major Carp (Mohanty 2010).

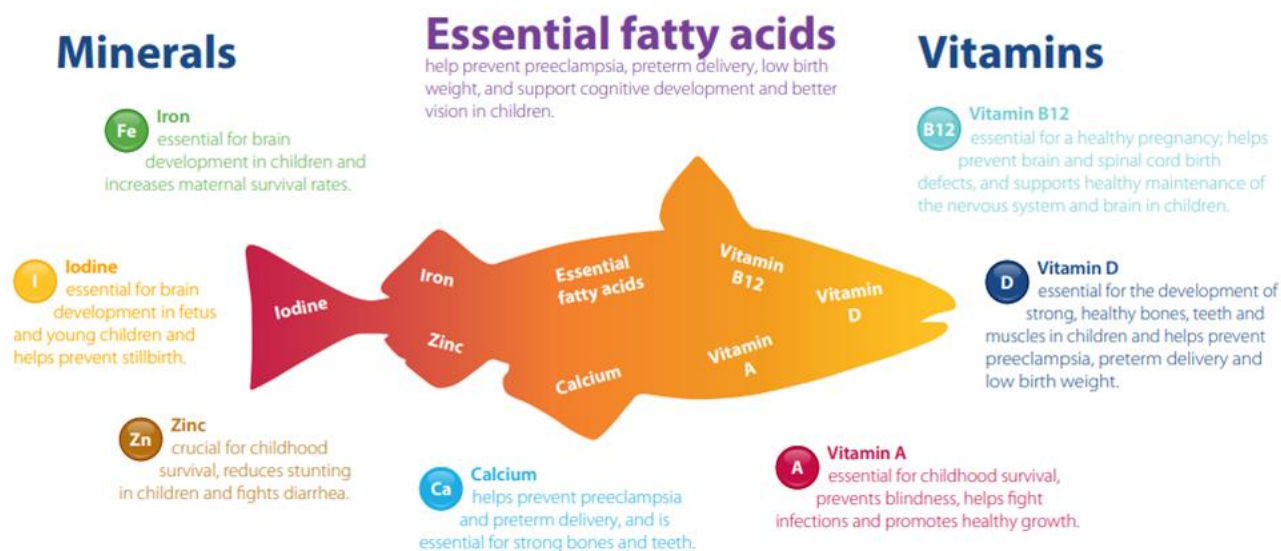


Figure 2. Nutritionnel importance of Fish. (Source : UN Nutrition, 2021)

Fish consumption in Assam

In 2017, fish accounted for about 17% of total animal protein and 7% of all proteins consumed globally (FAO 2020). With the increase in population across the globe, fish represents an important source of animal protein. Global per capita fish consumption is reported to be 20.5 kg in 2018.

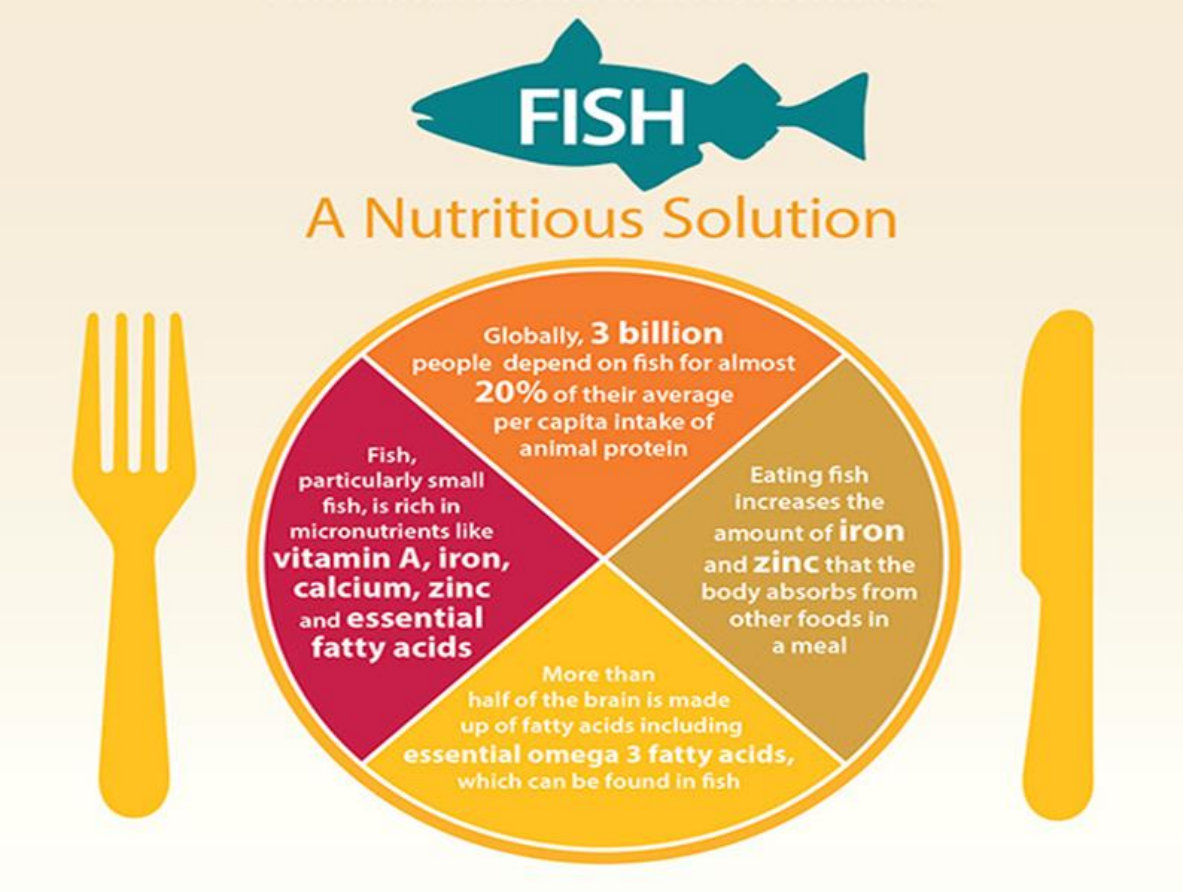
Around 90% of the people in Assam prefer to fish in their meals; therefore, fish occupies an important place in the lives of the people. Per capita fish consumption in Assam increased to 12 kg in 2020-21 from 11 kg during 2019-20 (Government of Assam 2022).

The fish value chain studies conducted under the APART project highlighted that 85% of pregnant women and lactating mothers preferred to eat fish at least twice a week (Mandal et al, 2020). Hence there is a good scope to include fish in the diets of PLW and children in the state.

Promoting fish consumption under APART project

The government of Assam (GoA), through the Government of India, has received a loan of USD 200 million from the World Bank for the implementation of the Assam Agribusiness and Rural Transformation Project (APART) which is being implemented through The Assam Rural Infrastructure and Agricultural Services Society (ARIAS). The project is working on 5 key objectives and one such objective is to improve the fish value chains and human nutrition. Under this objective, the project aims to increase the availability, accessibility, and consumption of nutrient-rich fish, especially for women of reproductive age, adolescent girls, infants and young children.

One of the key activities (Deliverable 7) under the APART project is “Improving impact of aquaculture and beel fisheries on human Nutrition”. WorldFish with partners is supporting the implementation of this activity. This consolidated report summarizes all the work done by WorldFish and partners as part of deliverable 7.



Methodology adopted

To achieve the project's objectives, two different strategies were implemented. Firstly, SBCC resources were developed to highlight the nutritional benefits of fish for human health. Secondly, a capacity-building exercise was conducted with various stakeholders, including the community. An internal rapid situation analysis was conducted to determine the course of action, and the Department of Fisheries, Govt. of Assam, was actively involved. Both top-down and bottom-up approaches were adopted to ensure maximum impact.

Community mobilization is a critical factor in increasing the capacity of a community to identify and address its own needs while developing local solutions to problems. It is essential to engage all sectors of the community to encourage individual, family, and community action. The study utilized several community engagements approaches to raise awareness and empower individuals and groups to take action, thereby creating an environment conducive to positive change.

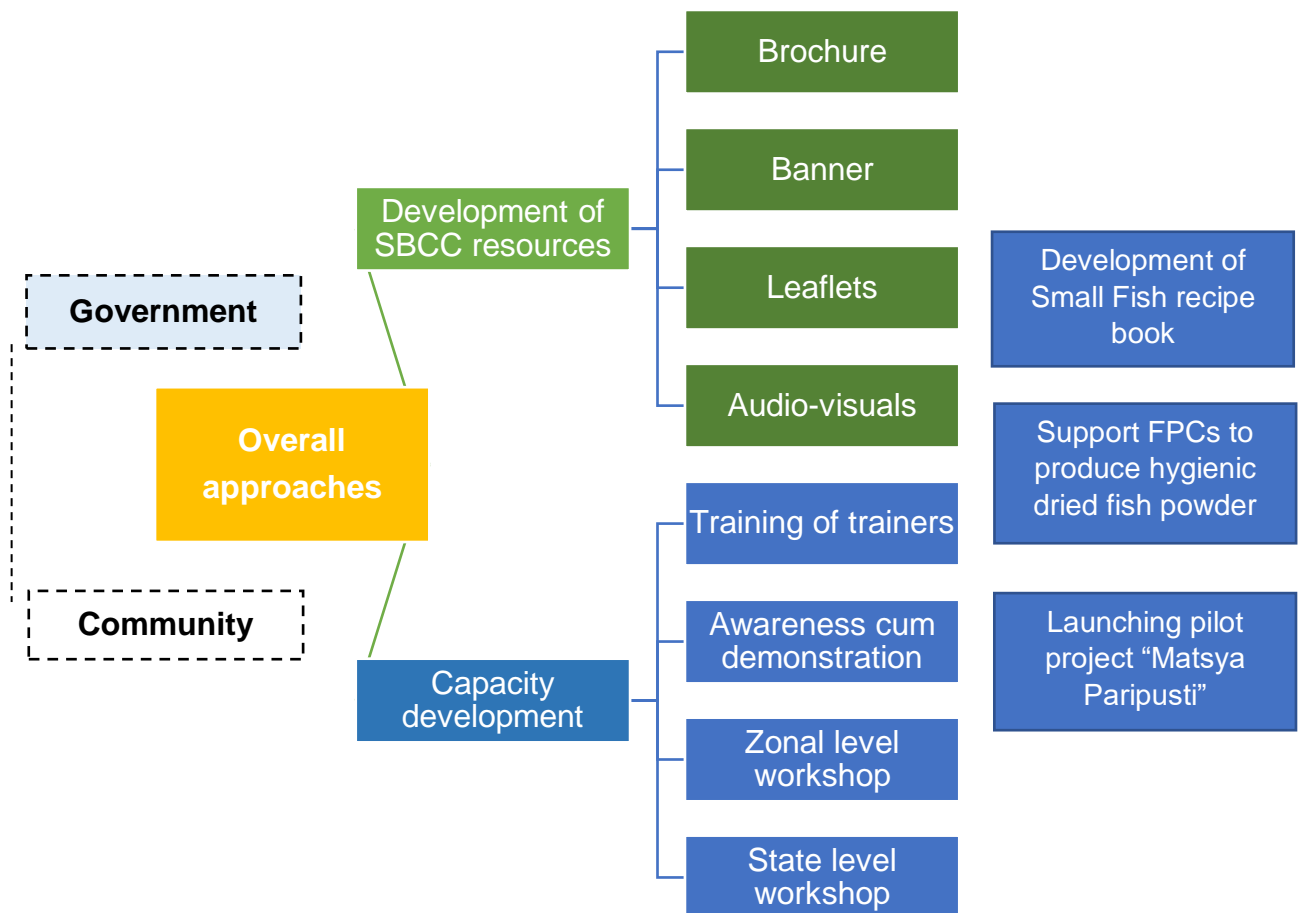


Figure 3. Overall approaches and actions followed.

SBCC proved to be a highly effective means of conveying the benefits of fish consumption for human nutrition. To this end, six types of SBCC materials were developed, including flex, leaflets, brochures, calendars, and audiovisuals, tailored to the needs of the target audience. Each material was subjected to rigorous testing, taking into account the language/dialect and cultural attributes of the intended audience, and developed in collaboration with beneficiary groups. The materials were disseminated to stakeholders at awareness meetings, training programs, and workshops.

To promote fish consumption among vulnerable communities, pregnant and lactating women, children, and adolescent girls, the project initiated preliminary discussions with government officials and developed an action plan. Stakeholders were trained through a variety of methods, including Training of Trainers (ToT), cluster-level awareness meetings, demonstration programs, zonal and state-level workshops. The facilitator encouraged participants to generate new ideas and suggestions through a brainstorming process during the training sessions. All suggestions were welcomed, and criticism was avoided during the discussions. Participants were encouraged to explain their ideas and focus group discussions and face-to-face interactions created opportunities for individuals to express their thoughts and ideas. The entire program was conducted in a participatory manner, using games and energizers to create an environment conducive to learning. Adult learning techniques, such as the use of audiovisual aids and storytelling, were employed, allowing participants to share their experiences and engage actively in the learning process. Finally, the stimulus-based training approach was utilized to create a realistic learning environment that mirrored real-life work and scenarios.



Output and results achieved

A. Development of SBCC resources

Social and Behavioural Change Communication (SBCC) is a powerful tool that promotes positive health behaviours among individuals, communities, or groups by addressing prevailing health problems. This was accomplished through the implementation of effective communication strategies, including the systematic dissemination of information through various channels such as interpersonal communication, print, visual, audio, and digital media.

By utilizing SBCC, the project was able to effectively educate and inform individuals and communities about the importance of adopting healthy behaviours. The use of various communication channels helped to ensure that the message reached a wider audience, enabling more people to understand and act on the information provided. Overall, the project successfully leveraged SBCC to bring about positive changes in health behaviours within the target population.

Objective of SBCC strategy

The objective of the SBCC strategy was to increase adoption and maintenance of positive behaviours among mothers and caregivers of young children and small-scale fish farmers. The strategy is developed to be achievable within the APART Activity period. This strategy is intended to be used by WorldFish and APART project, activity implementation partners as a roadmap of the communication activities and platforms that the activity pursued.

SBCC strategic planning process

A Social and Behaviour Change Communication (SBCC) strategy is the bridge between the situation analysis and the actual implementation of the SBCC program, and guides the creation and rollout of materials, products, and activities. The strategy served as a roadmap to guide WorldFish APART activities by providing direction and ensuring that the different products, materials, and activities all ultimately work well together and support each other toward a clear vision for change.

Two billion people worldwide suffer from malnutrition, a preventable yet life-threatening condition. Aquatic foods are rich in the vitamins, minerals, healthy fats and nutrients essential to human health and brain development, particularly in the first 1000 days of a child's life. WorldFish research helps communities to produce, access and consume nutritious aquatic foods for better health and well-being. SBCC is an integral element in the adoption of high-impact nutrition practices and prevention of undernutrition especially during the critical first 1,000 days of a child's life. WorldFish places a heightened focus on SBCC, as a key and fundamental, cross-cutting strategy to

address both undernutrition and anaemia globally. SBCC is a critical element of WorldFish's overall strategy and interventions in India and abroad.

SBCC Strategic Planning Workshop

To promote positive behavioural change among different stakeholders the project developed several IEC materials in collaboration with different partners. For greater dissemination at the project intervention districts of Assam, the project organized one workshop/consultation, followed by a series of informal meeting in order to develop IEC materials and implement the Social Behaviour Change Communication (SBCC) strategy.

The one-day SBCC strategic planning workshop was organized in the conference hall of SIPC, Nayantara building, Six Mile, Guwahati, Assam by WorldFish on 18th January 2022. Total 11 numbers of participants joined the workshop. Under the guidance of Dr. Suresh, Project coordinator, WorldFish project-Assam, the workshop was facilitated by SBCC technical staff from APART Assam headed by Mrs. Dimple S. Das and Dr. Baishnaba Charan Ratha, WorldFish Senior Consultant (Nutrition and Public Health). In the beginning of the workshop, detailed discussion was conducted to revise and update the existing project strategy related to the SBCC work and identify opportunities to further engage community-level stakeholders for nutrition in WorldFish's target areas.

The specific objectives of the workshop were to:

1. Review the existing SBCC strategy in APART.
2. Reviewing the present SBCC materials in the WorldFish Odisha project.
3. Draft an outline of our SBCC strategic approach and operational framework based on WorldFish/Assam's current activities and partnerships.

Key components of the workshop were:

- Understanding the current nutritional situation in Assam, India (data from NFHS-5).
- Presentations on formative research around similar target audiences and nutritional practices by the WorldFish Odisha project.
- Identification of target and influencing/secondary audiences, determinants of behaviours, and potential communication channels.
- Defining behaviour and social change objectives for APART programming.
- A conceptual mapping exercise to outline key players/partners, and opportunities and how they interact with the primary and secondary audiences for individual behaviour change and broader social change; and
- Identification of gaps within SBCC activities and partnerships, suggestions for additional opportunities given WorldFish's current interventions and partnerships, and identification of additional avenues for collaboration on SBCC where feasible.

Target Audiences

Under agriculture sensitive approach, WorldFish APART World Bank supported project is focused on the 1,000-day ‘Window of Opportunity’ which targets pregnant women and lactating mothers (PLW) and children under two years of age. Sensitizing adolescent girls was also a focus area during all nutrition-related activities. However, project activities focused on multiple audiences in order to stimulate effective social and behaviour change around the priority behaviours outlined above.

Primary Audience

Pregnant and lactating women with children under two were the primary project target audience. These women were direct participants of the awareness cum demonstration programme, stakeholders’ workshop and different cluster, block and district-level workshops as well as indirect and/or direct participants of other community outreach efforts.

Secondary Audiences

The husbands of PLWs with children under two, childcare givers and mothers/mothers-in-law were considered secondary audiences for the project. Both groups played a key role in decision-making for household activities and influenced purchasing food, selection of meals, division of labour in the household, etc. Frontline workers, including ICDS, health workers and other community extension agents, also play an important role as a secondary audience given the extensive role of training these cadres in the WorldFish APART World Bank supported program.

Gender integration

As part of the WorldFish-APART project framework and its approach in-state Assam, WorldFish work incorporated a gender approach into its work through its involvement with other members of the household, specifically mothers-in-law and husbands, in order to encourage behaviour change and to foster a conducive environment for improved nutrition at the household level. Taking into consideration the traditional role of women in Assamese households, it was important to involve mothers-in-law and husbands as these two groups often have considerable influence over the mothers’ workload in response to household responsibilities as well as the feeding practices of both the mothers and children. Their support is critical to the household’s ability to show positive changes in nutrition behaviour, both for the women and the children.

The following is a free list of identified targets and influencing audiences for community behaviours

- Influential community members
- Pregnant women and lactating mothers (PLW)
- Adolescent Girls (AG) /boys
- Mothers/caregivers/mother-in-law
- Husband/father/father-in-law
- NGO representatives/ PRI representatives
- Community people
- Farmers/beel communities/Farmers Producer Companies (FPCs)

Among other target audiences included mainly the officials who were the primary point for dissemination of nutrition messages to communities.

- Frontline ICDS supervisors, Anganwadi workers (AW), Anganwadi helpers/assistants
- Front line health field staff - ANM, ASHA
- Department of Fisheries officials
- Tribal development autonomous body representatives

Following the workshop, an SBCC strategy was drafted for the project to guide programming decisions and ensure a focus on social and behaviour change strategies within program activities. The planning process served to foster better understanding and buy-in for SBCC activities among all project staff and provided a more clearly defined project strategy related to the SBCC work.

SBCC/IEC development under the project

Increasing the availability, accessibility and consumption of nutrient-rich, safe fish, especially for women of reproductive age, infants and young children is one of the main components of the WorldFish-APART consultancy agreement.

Under fish-based human nutrition promotion activities, WorldFish has engaged their senior staff for the development and implementation of the Social Behaviour Change Communication (SBCC) strategy and the materials for dissemination among the community members. It aims towards creating an integrated, multi-disciplinary SBCC approach that take into account collective social structures and people's complex daily lives and fetches collective responses among the communities.

The intervention coupled with the SBCC /IEC materials is helping in improving the knowledge, attitude and skills of the community members, secondary and primary stakeholders and service providers and service receivers on fish for improved nutrition and enhanced demand for fish as nutrient food options in the State of Assam.

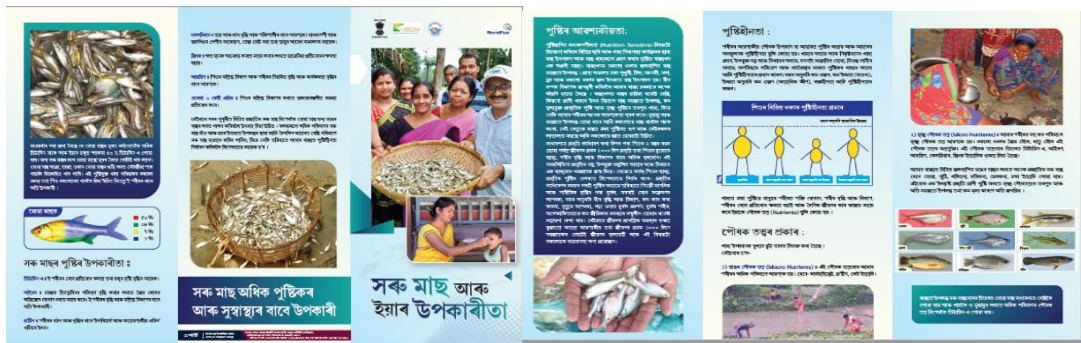
WorldFish has supported similar work in the state of Odisha, India for the promotion of nutrition-sensitive aquatic food systems. The project reviewed all existing SBCC materials from the Odisha WorldFish project and selected some of them which were more relevant to the Assam situation. All SBCC/IEC materials; tested with the premise of languages/dialects and cultural attributes were developed by engaging the beneficiary groups.

To create awareness amongst the ICDS and health functionaries, fisheries staff, Beel community and other community members on the benefits of consumption of small fish, the project used various SBCC materials like leaflets, posters, videos, and brochures developed by the project.

SBBC material developed by the project is described below:

• Brochure

The project has developed one brochure on “Benefits of small fish consumption” in the Assamese language. The 6-fold brochure consists of information on the demographic details of Assam, the status of malnutrition, the type of small indigenous fish availability and its benefits of consumption for human health. This document is intended to be used in the capacity building of stakeholders like fisheries officials, ICDS and health officials.



• Banner

A banner based on the theme “Benefits of eating small fish, particularly in first 1000 days of life” was developed particularly for community members (Assamese language). The flex contains information on the nutritional value of small fish and promotes consumption among pregnant women and lactating mothers and children during the first 1000 days of human life.



- Leaflets

Two leaflets were prepared. One leaflet focused on the nutritional value of small fish consumption and the other on the method of fish powder preparation at the household level, the benefits of small fish consumption for PLW and children. This was distributed as training reference material during community awareness programs.



Flex on Nutritional value of indigenous small fishes



Flex on Benefits of small fish consumption for PLW and children

- **Calendar on small fish consumption promotion message**

A small message about small fish benefits was printed on the calendars and distributed in ICDS offices and common community places



- **TV Spot: Nutritional benefits small fish consumption for maternal and child health**

Under Odisha- WorldFish Project, to create awareness among the community, a short cartoon video using the Tiki Mausi Mascot on “benefits of small fish-based Nutrition in the first 1000 days of life of the child” was prepared in collaboration with WCD&MS and UNICEF Odisha. The same video was translated and edited into the local Assamese language. This video is being extensively used by the project to disseminate the fish-based nutrition for human health related message to the public.



The TV spot was a 90-second-long animation film. The key character of the animated film is Tiki Mausi. In the film, she (the key character) is narrating to Meena and her husband the other character, about the benefit of eating small fish. The vitamin component of small fish is also discussed in the animated film. The spot can be accessed using the link:

<https://drive.google.com/file/d/1RKDuU78l3VbCqIO5PXNOG5y5NwYKIdP/view?usp=sharing>

- **Fish Theme song (Assamese)**

The cartoon-based song is translated from an original Bengali song prepared by WorldFish Bangladesh, a song theme on the benefit of small fish eating for the good health of child and mother. The song can be accessed using the link:

https://drive.google.com/file/d/1-RKoKMFEl0ePbTZl5UOJKVYvYtflULT8/view?usp=share_link



B. Capacity building of stakeholders under the program

Based on deliverable 7 of the APART Assam project “to improve the impact of aquaculture and beel fisheries on human nutrition”, the WorldFish Assam team conducted numbers of awareness, piloting and demonstration activities in different parts of Assam from March-November 2022.

In total 2591 participants including mothers, children, caregivers, adolescent girls, community members, ICDS staff, ASHA workers, and community resource persons were directly supported to build their awareness and capacity. The promotion of fish consumption among stakeholders was done through different capacity-building programs. These were:

- I. Training of trainers on the promotion of benefits of small fish consumption
- II. Awareness cum demonstration programs at community/cluster level
- III. Zonal level workshop for stakeholders
- IV. State-level awareness workshop



I. Training of trainers on promotion of benefits of small fish consumption

The project trained the ICDS officials/staff, Fisheries officials, ASHA health workers and Farmer Producer companies. They are the key people in delivering nutrition messages to the community effectively. In total 597 people participated in the workshop in 12 batches held in 6 districts of Assam. Among them, 71 were fisheries officials, 320 ICDS staff, 26 ASHA workers, 180 FPC members and others. A similar format was followed in delivering all 12 batches of ToTs. The details of the training are given in table 1.

Table 1. List of the stakeholders' capacity building for small fish-based nutrition program.

Sl.No	Date	Districts	Fishery Officials	ICDS Officers/Staff	Asha	FPC/Others/Children's	Total
1	09/03/2022	Kamrup	7	2	0	19	28
2	25/03/2022	Kamrup	3	2	1	24	30
3	19/05/2022	Goalpara	5	38	2	6	51
4	21/06/2022	Goalpara	6	32	3	11	52
5	22/06/2022	Goalpara	5	37	2	19	63
6	03/08/2022	Jorhat	7	39	5	4	55
7	05/08/2022	Jorhat	6	31	0	0	37
8	08/08/2022	Morigaon	3	36	2	10	51
9	08/08/2022	Morigaon	11	3	4	35	53
10	12/08/2022	Goalpara	5	67	2	10	84
11	20/08/2022	Barpeta	7	9	3	38	57
12	03/11/2022	Darrang	6	24	2	4	36
Total			71	320	26	180	597



Dr. Baishnaba Charan Ratha, Senior Specialist, Nutrition and Public health, WorldFish, started the session with a briefing on the importance of diversified diets in the first 1000 days of life. Then he described the difference between nutrition-specific and nutrition-sensitive interventions. Nutrition-specific interventions address the immediate determinants of malnutrition and Nutrition sensitive interventions will address the underlying and systemic causes of malnutrition. He highlighted that most of the regular interventions in ICDS include nutrition-specific interventions such as

- Preventive zinc supplementation
- Promotion of breastfeeding
- Appropriate complementary feeding
- Management of moderate acute malnutrition
- Folic acid supplementation
- Maternal balanced energy protein supplementation
- Maternal multiple micronutrient supplementation
- Vitamin A supplementation
- Maternal calcium supplementation
- Management of severe acute malnutrition

Nutrition-specific interventions alone will not eliminate undernutrition; however, in combination with nutrition-sensitive interventions, there is enormous potential to enhance the effectiveness of nutrition investments worldwide. Therefore, nutrition-sensitive interventions should be focused such as

- Family planning: healthy timing and spacing of pregnancy
- Water, sanitation and hygiene (WASH)
- Nutrition-sensitive agriculture
- Food safety and food processing
- Early childhood care and development
- Girls' and women's education
- Economic strengthening, livelihoods, and social protection

The APART project used Nutrition-sensitive agriculture approach that seeks to ensure the production of a variety of affordable, nutritious, culturally appropriate and safe foods in adequate quantity and quality to meet the dietary requirements of populations in a sustainable manner. Under the project, nutrition-sensitive aquaculture is being promoted through carp mola polyculture production and the promotion of fish consumption.

The other topics covered in the training were as below:

- Status of malnutrition in the state of Assam and knowledge sharing on the health benefits of fish as part of a diversified diet.
- Importance of diversified diet in first 1000 days of human life
- Methods of preparation and incorporation of fish powder at the household level by mothers/caretakers
- Shared knowledge on dried fish and fish powder and their nutritional benefits.

- Fish/ powder recipe Cooking demonstration

Following SBCC materials were shared with the training participants:

- Tiki Mausi Mascot video on Fish Based nutrition in the first 1000-day of human life (Assamese)
- Video on benefits of small fish consumption (Assamese)
- Brochure on “Small Fish Big Benefits”
- The calendar on fish-based nutrition product
- Leaflets on fish based nutrition for human health

The roles played by ICDS staff after the ToT

- Delivering key nutrition messages on the benefits of fish consumption by children, pregnant and lactating mothers during all the meetings such as village health sanitation and nutrition day (VHSND), immunization day, POSHAN *maah*, monthly sector level review with AWW awareness programs and home visits.
- Training mothers/caregivers, the method of preparation and incorporation of fish powder in the regular meal of children.

Suggestions from the participants of the training

ICDS staffs

- To scale up the inclusion of fish in ICDS SNP program, the participants suggested the project to ensure the continuous supply chain of fish-based products.
- Hygienic dried small fish can be supplied to PLW as Take-Home Rations (THR) under ICDS SNP.
- Regular support from the project to reduce the effect of malnutrition and anaemia in aspirational districts through awareness on fish based nutrition.
- The project covered only 12 districts during the awareness and demonstration programs so the participants requested that such awareness should be done across the state covering all the supervisors and workers.

Fisheries officials

- Development of more nutrition-sensitive as well as nutrition-specific SBCC material to reach a higher audience.
- Promotion of small fish in beels which will help to increase the consumption of small fish among the vulnerable beel dependent community.
- Continued support to different FPC for production
- Increased nutrition interventions through awareness and demonstration programs across the state
- Convergence with the different department for effective implementation of the program

II. Awareness-cum demonstration program at community/cluster level

The project conducted 36 numbers of awareness cum demonstrations in 12 districts of Assam viz; Morigaon, Kamrup, Nalbari, Sanitpur, Lakhimpur, Sivsagar, Jorhat, Majuli, Darrang, Barpeta, Gaoalpara and Nagaon. All 36 programs followed a similar agenda as shown in Table 2 below.

Table 2. Time Schedule and agenda of awareness and demonstration program on topic “Promotion of fish consumption for human health”.

Time	Program
10.15 – 10.30 AM	Registration
10.30 – 10.45 AM	Welcome address & training brief
10.45 – 11.15 PM	Nutrition and Health Status of Assam
11.15 – 12 noon	Importance of diversified diet in first 1000 days of human life
12 PM–12.15 PM Tea break	
12.15 – 1.15 PM	Benefits on small fish consumption for first 1000 days of child life
01.15 – 1.45 PM	Preparation of fish and fish-based product
01.45 – 2.15 PM	Recipe demonstration and taste trial
02.15 – 2.45 PM	Open discussion and feedback
02.45 - 3.00 PM	Concluding remarks and vote of thanks

Overall objectives of the awareness program

- To understand the importance of improved dietary diversity and micronutrient intakes involving small fish-based products in the first 1000 days of human life.
- To educate the significant health benefits of small fish consumption and promote the inclusion of small fish-based nutrition in the diet of women especially, pregnant and lactating women, infants and young children.
- To promote hygienic dressing of locally available nutritious small fishes and the importance of eating whole small fish without wasting the head and bones.
- Train to prepare small fish paste/powder at the household level and include in the diet of young children.
- To share the experiences (Test acceptability of products e.g. appearance, taste, smell, ease-of-use) of piloting and demonstration of different small fresh/dried fish recipes in different communities of Assam.
- Identify the traditional cooking practices of small fish-based recipes which are popular and acceptable among different communities.

Table 3. Detail schedule of awareness cum demonstration programme under APART in Assam.

Sl.No	Date	District	Fishery Officials/ Other Officials	ICDS	Asha	Women/ Pregnant women/ Lactating mothers	Adolescents girls/ Children's	Community leader/ Other participants	Total Number of participants
1.	08/03/2022	Morigaon	11	3	2	25	7	5	53
2.	09/03/2022	Kamrup	10	2	1	31	16	7	67
3.	10/03/2022	Nalbari	5	1	1	35	9	3	54
4.	12/03/2022	Sonitpur	4	11	9	73	37	7	141
5.	14/03/2022	Lakhimpur	5	2	1	33	11	2	54
6.	15/03/2022	Sivasagar	4	0	1	29	9	9	52
7.	16/03/2022	Jorhat	7	5	1	20	18	2	53
8.	17/03/2022	Majuli	5	2	3	23	13	6	52
9.	22/03/2022	Kamrup	2	1	0	29	12	5	49
10.	23/03/2022	Darrang	2	0	2	49	10	6	69
11.	24/03/2022	Morigaon	3	2	1	21	25	1	53
12.	30/03/2022	Morigaon	5	1	1	41	12	3	63
13.	07/05/2022	Nalbari	7	2	1	24	3	15	52
14.	08/05/2022	Nalbari	3	1	0	7	2	38	51
15.	09/05/2022	Nalbari	3	0	1	10	3	18	35
16.	09/05/2022	Nalbari	4	2	0	8	1	36	51
17.	12/05/2022	Barpeta	4	2	2	24	8	13	53
18.	12/05/2022	Barpeta	5	1	2	15	5	22	50
19.	13/05/2022	Barpeta	4	1	0	21	4	24	54
20.	13/05/2022	Barpeta	4	0	1	19	3	23	50
21.	19/05/2022	Goalpara	6	2	1	33	0	10	52
22.	18/06/2022	Goalpara	5	2	1	34	0	16	58
23.	07/07/2022	Morigaon	6	1	2	35	5	3	52
24.	07/07/2022	Morigaon	5	1	1	36	5	7	55
25.	09/07/2022	Kamrup	3	0	1	25	5	17	51
26.	02/08/2022	Sivasagar	5	1	0	15	9	21	51
27.	04/08/2022	Jorhat	4	0	1	25	2	19	51
28.	04/08/2022	Jorhat	4	2	1	23	6	15	51
29.	08/08/2022	Morigaon	2	0	1	22	4	22	51
30.	09/08/2022	Kamrup	3	2	3	25	7	13	53
31.	10/08/2022	Nagaon	8	0	1	27	4	11	51
32.	10/08/2022	Nagaon	8	1	1	22	0	20	52
33.	11/08/2022	Nagaon	9	2	3	14	9	17	54
34.	19/08/2022	Kamrup	2	3	2	24	6	11	48
35.	19/08/2022	Kamrup	2	8	5	30	0	9	54
36.	20/08/2022	Barpeta	4	2	3	25	2	18	54
		Total	173	66	57	952	272	474	1994



Target population

The primary stakeholders for the awareness cum demonstration program were adolescent girls, pregnant women, lactating mothers, children of different age groups and community members. The program was facilitated by WorldFish Senior Nutrition expert with support from APART project staff. The program was also attended by ICDS staff including Child Development Project Officers, Supervisors, Anganwadi workers and Sahayika (helper), Field health staff, ASHA, PRI representatives, community leaders, farmers, and teachers. In total 1994 people participated in the program which included 952 PLW and 272 adolescent girls and 474 community members.

Planning and preparation

During the planning of awareness cum recipes demonstration activities, the project team surveyed different local fish markets to understand the availability of varieties of small fishes and the prices of the fish. Also, the team recorded the different fish recipes prepared at nearby hotels and restaurants. The team conducted a focus group discussion with community resource persons (CRP), and local NGOs, to understand the availability of small fishes, their local food preferences and their expectations during awareness, piloting and demonstration activities. The project team also tried to understand which age category of children are consuming small fish more, the type of recipes prepared in the household, frequency & quantity of consumption also recorded.



1. Awareness on benefits of small fish consumption

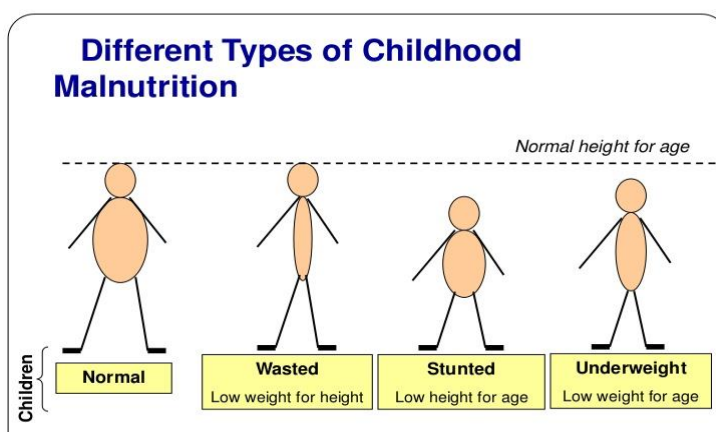
Technical Session

Session 1: Introductory talk about the programme objectives and activity planned

The program commenced with a welcome from the host. The participants were asked to introduce themselves. With an introduction to the APART -WorldFish project working in Assam on various aquaculture and fisheries aspects including nutrition, the facilitators shared the details on the objectives of the program.

Session 2: Nutrition and health scenario of Assam state and consequences

The session initiated with Dr. Baishnaba Ch Ratha, Senior Specialist, Nutrition and Public Health, WorldFish asking the audience the necessities of humans. Some listed food, some said clothes, and few said place to live. Then he explained having good health is the utmost necessity without which human being suffer a lot in spite having



access to food, clothes and home. Then he briefed the audience on nutritional status of Assam with reference to National Family Health Survey report 5. He explained meaning of malnutrition and its two broad categories namely undernutrition and overweight. Undernutrition includes stunting (low height for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals). The other is overweight, obesity and diet-related non-communicable diseases (such as heart disease, stroke, diabetes, and cancer).

The NFHS data shows that 35 % of children under the age of five years are stunted or too short for their age, 22% are wasted or too thin for their height, 9 % of children are severely wasted and 33% are underweight children in Assam. As compared to NFHS 4, which held during the year 2015-16, the underweight has increased from 30 to 33 percent, which is alarming situation. These high levels of under nutrition among children are still a major problem in Assam. Similarly, anaemia is widely prevalent among adolescent girls and women mostly among pregnant and lactating women.

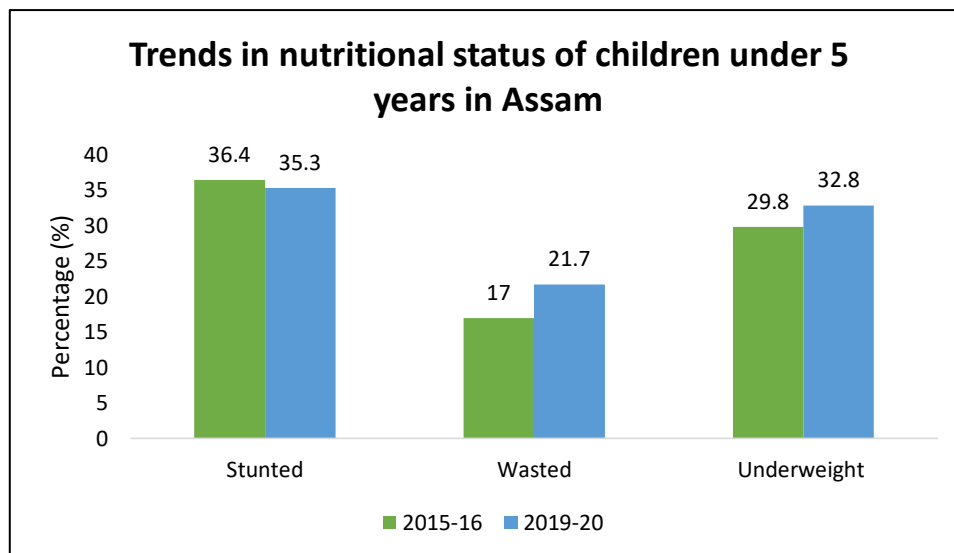


Figure 4. Trends in nutritional status of children under 5 years in Assam.

Session 3: Understanding Importance of diversified diet in first 1000 days of human life and the availability of nutritious food from local sources

Dr. Baishnaba Charan Ratha, Senior Specialist, Nutrition and Public Health, WorldFish presented a session on the importance of balanced diets for a healthy life.

He explained the changing scenario where 20 years back people were not able to afford 3 meals a day due to poverty, unavailability, and accessibility. Whereas, now most of the people get 3 meals a day but it does not fulfil the nutritional requirement of the body since they do not have knowledge on the importance of a diversified diet. Hence, they face a lot of health-related issues.

With a basic introduction to nutrition and the importance of dietary diversity for people of all ages, he discussed the three food groups—body-building foods, protective foods, and energy-rich foods with simple examples—and categorized local foods into each group.

He then defined the first 1000 days of child life, which many of the women understood to be the first 1000 days after the child's birth, forgetting about the important role of the woman in child development during pregnancy. He made clear that the first 1000 days refers to the period beginning with pregnancy, right from a baby's conception through to two years of child age. It is a critical window of opportunity to shape a child's development. Good nutrition during pregnancy and early childhood plays a vital role in shaping the health of children. Brain development is faster during the first 1000 days of life. Therefore, it is important for pregnant women and mothers to understand the importance of balanced diets.

Then, the discussion was held on different types of nutrients, particularly the role of micronutrients. Micronutrients play a major role in the metabolic activities and are essential for proper growth and development.

Different source of micronutrients including iron, zinc, calcium, vitamin A, B12, Omega -3 fatty acids and iodine are the most important to the health and development of populations worldwide, particularly children and pregnant women in low-income countries.

Following the clarification, the team discussed how to ensure good nutrition and dietary diversity for women and young children in this critical time, based on the food groups' availability locally. The discussions highlighted the severity of low dietary diversity for young children, as women remarked that children are fed only staple plant foods (usual rice), prepared rice with dal, a small number of vegetables and are infrequently fed fish and other nonveg products, in the form of curry or fry.



Session 4: Benefit of fish, particularly small fish for better health

In this session, discussions were held with different age groups of women, farmers and community leaders regarding the nutritional benefits of small fish for heathy life and how increased consumption of small fish is helpful for women and children, particularly in the first 1,000 days of a child's life.

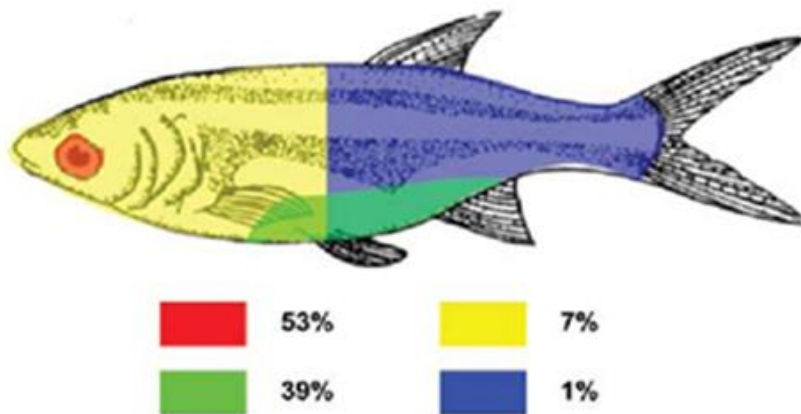
Dr. Baishnaba Charan Ratha, Senior Specialist, Human Nutrition and Public Health, WorldFish explained that, while the importance of fish as a source of animal protein and essential fatty acids is well known, little attention has been given to the role of fish as a source of micronutrients. Small fish species are rich in micronutrients, in particular, vitamin A, calcium, iron and zinc, as they are consumed whole with bones, heads and viscera where most micronutrients are concentrated. These species are commonly consumed by the poor, and thus have a high potential to address micronutrient deficiencies.

He just briefed on the role of few micronutrients and availability of these essential micronutrients in locally available food and fishes.

- **Vitamin A**

Dark-green, orange and yellow vegetables which contain provitamin A carotenoids have been considered as a major source of vitamin A and utilised in food-based approaches aimed for increasing vitamin A intake. Some of the fish species like mola (*Amblypharyngodon mola*) and Chanda (*Parambassis baculis*) contains vitamin A higher than that is available in other green vegetables like spinach. So, it is advisable to consume fish along with bones and eyes for maximum intake of vitamin A in the body.

Distribution of vitamin A in "mola". Vitamin A content: 2,680 RAE¹/100 g raw, edible parts. Length of whole "mola": 6–8 cm; weight of raw, whole "mola": 5–9 g.²



¹ RAE: retinol activity equivalent.

² Source: Roos et al. (2002).

- **Calcium**

In an interactive session Dr. Ratha described that many women after 40–45-year age face health issues such as back pain, joint pain, and dental problems due to reducing bone density. This is due to lack of calcium in diets and this is more commonly seen in women with kids. Because during lactation period, the child will receive calcium through mother which may cause the calcium deficiency in mother if adequate calcium rich food is not being consumed to meet the nutritional requirement.

Fish bones are very rich in calcium. In case of big fishes, it is not possible all time to consume all bone during eating big fish even for elders. So consequently, fish which are not eaten with bones do not contribute to calcium intake.

In many of the places usually fish bones are not served or consumed especially by children. Proper intake of calcium in diet throughout the pregnancy and lactation period women will help in healthier child growth. All small fish species have high calcium content such as puti (*Puntius ticto*) and chanda (*Chanda ranga*), having >800 mg/100 g raw from edible parts. Therefore, fish powder prepared with head and bones can be good source of calcium for kids of 2-6 year age group.

- **Iron and zinc**

Fish particularly small fish are rich in iron, and it concentrated in the head and viscera. Small fish eaten as whole are very rich in zinc compare with other animal source foods and large fish species. In rural Assam, low-market value small fish commonly consumed by poor people in particular, were found as very rich in zinc.

Among the different varieties of fishes available for human consumption, locally available small fish species like moa (*Amblypharyngodon mola*), puthi (*Puntius* spp), boliora (*Aspidoparia* spp) dorikona (*Esomus danricus*), prawn, and kholihona (*Colisa fasciatus*) are abundantly available in all the water bodies of Assam and have been found immense potential to improve nutrition and wellbeing. In Assam, fish is a popular, available and affordable source of food. Majority of Assamese (more than 90%) people eat fish on a regular basis. So, to include small fish in regular diet of pregnant and lactating mothers as well as young children during the critical first 1000 days has a big impact on their early childhood physical and cognitive development and immune system function.

Though many people consume small fish in the state, their nutritional value and right quantity and frequency of consumption are not known to them. The small fish when eaten whole, provide maximum benefits since it is rich in micronutrients like calcium, vitamin A, iron, zinc etc, which play important roles in child development and growth. Fish particularly small fishes, which are rich in micronutrients can easily be used in variety of nutritious and delicious local recipes and can be a part of healthy, diversified diet for children, pregnant woman, and lactating mother. Among all the small fish available in Assam, people relish eating mola (Mua), because for availability and taste

compared to other small fishes. Mola are an excellent source of micronutrients such as iron, zinc, calcium, vitamin A and vitamin B12, as well as fatty acids and animal protein. It is locally found low -cost small fish which provides multiple high levels of nutrients and fatty acids, which are capable of playing a unique role in developing the brain. It is an excellent food source for low-income families due to availability and low price point in rural part of Assam. Details discussion held on nutritional benefit of small fish is as below:

Table 4. Benefits of consuming fish, especially small fish.

Small fish nutrients	Children	Adolescent girls, Pregnant and lactating women
Omega-3 fatty acids	<ul style="list-style-type: none"> • Brain growth • Healthy eye • Less asthma 	<ul style="list-style-type: none"> • Healthy pregnancy • Health eye • Healthy hormones • Healthy heart • Less diabetes • Healthy weight
B12	<ul style="list-style-type: none"> • Healthy red blood cells • Healthy nervous system 	<ul style="list-style-type: none"> • Healthy pregnancy • Healthy red blood cells • Healthy nervous system • Prevent birth defects
Iron	<ul style="list-style-type: none"> • Brain growth • Healthy immune system • Prevents iron-deficiency anaemia 	<ul style="list-style-type: none"> • Healthy immune system • Healthy pregnancy • Prevents iron-deficiency anaemia
Zinc	<ul style="list-style-type: none"> • Healthy growth • Healthy immune system • Faster recovery from diarrhea • Prevent stunting 	<ul style="list-style-type: none"> • Healthy growth • Healthy immune system • Faster recovery from diarrhea
Calcium	<ul style="list-style-type: none"> • Healthy bones/teeth • Healthy nervous system 	<ul style="list-style-type: none"> • Healthy pregnancy • Healthy bones/teeth • Healthy nervous system • Healthy heart
Iodine	<ul style="list-style-type: none"> • Brain growth • Thyroid health 	<ul style="list-style-type: none"> • Healthy pregnancy • Thyroid health
Protein	<ul style="list-style-type: none"> • Physical growth • Healthy hormones • Healthy organs • Healthy nervous system • Prevents wasting 	<ul style="list-style-type: none"> • Physical growth • Healthy hormones • Healthy organs • Healthy nervous system

Some reasonable facts on consumption were also shared with participants on the benefit of more small fish consumption, and cost-effectiveness as compared to big fish. They were:

- Big fish distribution among family after cooking is quite difficult due to preference of specific fish parts by the family members. But in case of small fishes' good amount of fish can be equally distributed among all the family members.
- In many families, the mother or woman of the family has less chance to get the right quantity of fish curry for own consumption, whereas, in the case of small fish recipes, every family member has an opportunity to get an equal quantity of small fish for own consumption.
- Small fish consumption whole including head and bone has an opportunity to get all required micronutrients like iron, calcium, Zinc, Vitamin- A & B12, Omega-3 fatty acid & iodine in marine fish. Whereas bones of the big fishes are usually not consumed and preference of the family members for certain part (head, middle and tail part) of the fishes which may not contain all the nutrients.
- In rural areas, small fish can be purchased at relatively lesser price and quantity when compared to big fish which makes it easy to cook curry and consume by all the family members.
- Small fish can also be kept for more days in dried form for the availability for regular family consumption.

In last part of session, project team clarified about the importance of fish processing and its effects on nutritional value of products. Because some vitamins are sensitive to heat, sun light and water, while other nutrients such as protein, fat, iron and calcium are stable, even after processing and cooking.

After understanding local available vegetables, fruits and home-grown cooking methods from participants, Dr Ratha explained that vitamin C from vegetables and spices enhance bioavailability of iron in human body, but sometimes it depends on the availability of diverse and right quantity of vegetables and spices and use. Lemons are very much available and acceptable fruits by all. It contains high amount of Vitamin C, Dietary fibre, Citric acid and iron. So, it was advised to add one to two drop of lemon juice in curry of each one of family member, when curry is less hot. Similarly, Vitamin D is very much essential to absorb Calcium in body, which is available in morning sun light, oily fish, red meat,



liver, egg yolks and to some foods too, including breakfast cereals, plant milks and fat spreads.

Summary of the technical sessions

- Diversified diet is important to meet the nutritional requirement of the body. Therefore, it is essential to include the locally available food such as seasonal vegetables, fruits, cereals, grains, milk, egg in the diet along with fish and fish-based products.



2. Cooking demonstration

A cooking demonstration is a practical way of showing how to prepare, process and preserve readily available local foods. The cooking demonstration provides a platform to have discussions with the community and understand their cooking practices, cultural food habits etc. Often families are not aware of locally available, seasonal healthy foods which are rich sources of energy and nutrients. Therefore, cooking demonstrations serve as a platform and behaviour change tool to generate awareness about healthy nutritious foods and the importance of their consumption. Cooking demonstration is best done with a small group of participants (10 to 20) to ensure that all can observe and learn.

Here, the demonstrations were intended to show recipients different fish-based recipes, methods of preparing fish-based recipes along with vegetables, preparation of small fish and handmade fish powder at household level.

Main objectives of cooking demonstration

Main aim of the demonstration was to provide an opportunity for participants to learn and practice recommended for processing and preparation techniques using readily available local foods and ingredients for improved nutrition.

- To build awareness of the participants on the importance of improved dietary diversity and micronutrient intakes involving small fish-based products.
- To demonstrate the methods of incorporating locally available small fish and homemade small fish powder and paste in their regular cuisines.
- To provide participants an opportunity to taste prepared dishes and give feedback on the colour and appearance, aroma/smell and taste of the fish dish.
- To transfer knowledge and skill to participants about how to prepare a small fish-based recipe that is diversified and of appropriate consistency amount, and frequency for infants, children and women.
- To influence mothers, caregivers and other community members to practice optimal infant and young child feeding practices and adopt a balanced diversified diet including small fish.



Identification of location for the demonstration program

These decisions were taken considering the distance that participants have to travel (particularly women with children) and the facilities of the area. In selecting the place, the following points were considered:

- An area that is center (not too far) that participants, particularly women, adolescent girls, children could easily come and participate.
- Cleanliness of the area and availability of clean water.
- Venue/room able to accommodate participants and power supply facility.
- A place that has no or minimal disturbance.

Participants' mobilization

While preparing for the demonstration program, the project considered the beliefs and traditions, religious values, gender and indigenous knowledge on nutrition of the targeted audience. All the participants were given prior information on time, date and location.

Follow safe and hygienic practice during cooking, demonstration & taste trial of recipes

Before joining the cooking process, the team informed participants about the importance of general sanitary practices like hand washing, cleaning of all the utensils & equipment used during the product of preparation. Small fishes (both fresh and dried) were washed thoroughly before cooking. In many places, women and adolescent girls were involved in cooking activities, used cooking hand gloves, aprons and head caps during preparation.

Collection of cooking equipment

Cooking equipment like Liquid Petroleum gas with stove, utensils, mixer grinder, paper plates and cups for the hands-on demonstration was arranged by the community and to some extent by the project. The project decided to pilot & demonstrate a few simple recipes, then overburden a parent with too much information. Thus, the kitchen, the utensils and the method of preparing and cooking are similar to those used within the homestead.

General Instructions for cooking demonstration:

- Dress appropriately i.e., wear clean clothes, short and clean fingernails and cover one's hair.
- Arrive at least one to two hours early depending on the amount of preparation time needed.
- Set up the cooking station and preparation area.
- Arrange seating plan and any written materials.

- Arrange participants so that everybody can see, hear and participate.
- Display and describe all materials and ingredients to be used.
- The audience should be given an overview of the demonstration including what will be covered, the main nutrition theme, and appropriate length of the demonstration. The nutrition messages should be repeated often throughout the presentation.
- Explain in detail the chosen recipes with a focus to the food groups.
 - Focus on the foods or ingredients being used in the recipes and give details about their nutrient content, functions, processing, and preservation tips.
 - Find out if the participants have experience in preparing the planned recipe and let those who have ever done it explain to the rest of the participants.
 - Explain all the steps, demonstrate, and allow participants to take part in some of the steps. Allow participants to ask questions for clarification at each step. Let other participants comment and acknowledge their contributions.
 - Show the finished version of the recipe either picture or already prepared sample.
- Let participants prepare the food on their own with supervision.
 - I. Be sure to taste the food for correct seasoning before serving. Use a clean spoon for tasting the food.
 - II. Let all participants display and taste the cooked food and discuss alternative ingredients and equipment that can be used
 - III. Discuss the eye appeal, smell, taste and flavor of the food.

Small fish recipes and preparation techniques



Participants were asked about the different types of small fish recipes cooked regularly in the households. Mixed vegetables with fresh/dried small fish curry were found to be the most common recipe prepared at the community level.

Based on the feedback from the participants, the project planned to demonstrate the following 5 types of recipes during the program, where availability of cooking utensils was there in local level. The procedure/method followed for the demonstration was similar to the practices which are followed in the households so that it will be easy to prepare by the mothers/caregivers. The details method of preparation of the fish recipes is attached in Annexure 1.

1. Small fish paste and powder
2. Mixed vegetables with fresh/dried small fish curry
3. Mixed vegetable with fresh/dried small fish powder curry
4. Small fish powder soup
5. Dried small fish with pea and tomato curry

After a brief discussion on the above recipe's preparation steps, a detailed discussion was held on how to prepare small fish powder with locally available small fish and its inclusion in a regular diet for all, particularly children under 5 years. Fish powder preparation and consumption were very new to understand for the first time by all. A sample of a marine small fish powder packet with Food Safety and Standards Authority of India (FSSAI) certification was showed to all participants. They were allowed to touch and feel the texture of the fish powder. Then all the participants actively participated in the preparation of small fish powder followed by its use for making fish soup.

The facilitators explained the process of the cooking demonstration clearly and the responsibility of participants for all three recipes and informed and convince participants not to overcook vegetables by telling them about the loss of vitamins during overcooking.

Community participation

After the collection of locally available small fish, women from the community came forward for dressing and wash the fish hygienically with the guidance of project staff. Fish can be included in children's meal in 2 ways; 1) Cleaned fish roasted in low flame and then ground using mixer grinder to get a powder consistency 2) cleaned small fish is slightly fried in oil and then ground using mixer grinder which will be paste consistency. Both paste as well as powder can be mixed with children's regular meal. Then, dishes were cooked with the involvement of community people. The team advised participants to add some amount of lemon juice or coriander leaves in warm curry which are a source of Vit C and are helpful in the absorption of iron in the body.

After the preparation, mothers/caregivers, adolescent girls, children (more than 5 years) and other participants were allowed to taste the recipes. Upon satisfaction by mothers and caregivers, the soups were fed to the children under five years. After completion of programme, some women were very helpful in cleaning the used utensils, paper plates, and cups and cleaning the demonstration venue immediately.



Sharing of SBCC materials on small fish consumption and benefits

Two leaflets and a calendar on small fish consumption and their benefits in the local Assamese language were distributed among the participants during training as reference material. An AV song on the benefit of small fish consumption was also displayed during the awareness. The team sat along with the participants and discussed thoroughly the messages that were printed in the leaflets and calendar.



Monitoring the impact of cooking demonstrations

The project monitored and evaluated the cooking process, taste of the fish recipes, feedback and overall acceptance of prepared items and documented. Monitoring the impact of cooking demonstrations is important for the following purposes:

- To understand whether cooking demonstrations are influencing feeding practices, particularly among women, adolescent girls and children below of five years of age
- Identify any challenges in exercising the feeding practices promoted during cooking demonstrations
- Document good practices and challenges to use as lessons to revisit future cooking demonstrations
- Record the number of participants by sex, age and location

Observations and lesson learned

Participants were allowed to share their experiences after the demonstration program. Many of the children and women enjoyed the curries and soup. They expressed appreciation for their new knowledge on the preparation of small fish powder and the use of fish powder in soup and mixed vegetable curry. After open interaction with women, adolescent girls, Anganwadi workers, Anganwadi sahayika, ASHA, field project staff and other community members, the feedback of the program were recorded for further improvement of the programme implementation. Summary of the observations are listed below:

- Mixed vegetable small fish curry was very much the preferred recipe of all community members in Assam, but there was a hesitation among them to feed it to the children due to the presence of spines and bones.

- The mother or caregiver of some children below 2 years was worried to feed their children with fish soup and fish powder curry since the locally prepared fresh mola paste was not fine in texture. This can be overcome by preparing the fish paste using a mixer grinder.
- Elder women showed more interest in fresh mola fish paste since it was a very new concept for them compared to the mola fish curry. After tasting both dried fish powder and freshly prepared small fish paste, participants preferred the later more over the first one.
- The fishy odour of the powder/paste which is reported to make pregnant women nauseous can be 'hidden' in dishes using an appropriate amount of spice and vegetables.
- Some of the participants shared their apprehension to prepare a small amount of fish soup for one child as it is not possible all time. So, it is suggested to include fish powder in the regular curry of the family.
- In places where small fish availability is scarce, it is suggested to use dried small fish products for the preparation of soup and curry.
- Some participants also mentioned the unavailability of the hygienically dried small fish in their places and didn't have much awareness of the preparation of hygienically dry fish.
- In some districts where fresh mola is available in plenty, they also wanted to understand more about the process of preparing hygienically dried fish.
- Some mother and caregivers expressed their willingness to understand the right quantity and frequency of small fish consumption for children to acquire more health benefits.
- The participant also mentioned they have never heard about the concept of the first 1000 days of a child's life and its importance for the mother and the child.
- As suggested by some of the participants, making small fish powder/paste as a trial at the household level and after including in the common curry should be consumed by family elders first, because taste acceptance by family elders may be helpful to introduce it with more confidence in the regular diet of their children.
- Adolescent girls preferred both fresh and dried mola powder soup compared to the addition of fish powder/paste in curry.
- The majority of mother and adolescent girls opined that they learned the skills needed to make the fish-based recipe at home.
- Some reported that they did have hands-on practice to prepare fish powder and powder mixed curry during the demonstration.
- They also believe that the ingredients used in the demonstration were affordable and available where they normally shop.

Note:

In some of the places the fish recipe demonstrations were not done due to unavailability of suitable facilities like utensils, unavailability of fish etc.

Way forward

- The communities must be encouraged through continuous awareness to use fish particularly small fish and dried fish products in their regular cuisines.
- More no of AVs and SBCC materials can be prepared by the project based on the experience gained from the awareness and prepared materials should be converted with some local tribal languages.
- Women from the communities must be trained on preparation on hygienic dried fish paste/ powder preparation using locally available fish. Also, they should be given knowledge on the storage of the products for longer use.
- Follow-up action may be planned in all places, where programme is completed.
- Under the APART project, standard nutritional messages from all food groups may be planned in convergence ways with other CGIAR agencies like, IRRI, ILRI, CIP etc. So that, more diversified nutritional messages including fish based nutrition may be disseminated in the community level.
- More training may be planned for ICDS field staff, particularly Anganwadi Worker, Helpers, ASHA and Community Resource Persons (CRP), those who are working in remote places.
- Pilot study may be planned to include small fish based products (dried fish and Fish powder) in ICDS Supplementary Nutrition programme (SNP) of Assam.
- Short film on preparation method of small fish powder and its inclusion process in regular diet of children may be prepared.
- Social media, and electronic and print media may be helpful for more awareness at the community level.
- Increase hands-on practice during food preparation demonstrations for women and adolescent girls as possible to build confidence and skill as well as increase motivation toward diet-related behaviour change.





III. Zonal Workshop on Fish based nutrition for Human Health

Two numbers of zonal workshops were conducted by WorldFish in collaboration with ARIAS Society, and Department of Fisheries, Assam under World Bank funded Assam Agribusiness and Rural Transformation Project (APART).

Table.5. Details of zonal workshop done under the program

Date	03.07.2022	05.11.2022
Venue	Conference Hall, Assam Agriculture University (AAU), Khanapara, Guwahati	Composite training Centre, Dalbari, Morigaon
Key participants	DFDOs and FDOs from Department of Fisheries Senior Scientist from ICAR-CIFRI, NFDB Block Development Officer Technical Expert Fisheries (TEFs) and Engineer Consultant Fisheries (ECF) FPC members and beneficiaries of APART	ICDS supervisor Anganwadi workers/ helpers FPC members Students from College of Fisheries, AAU, Raha, APART field staffs from Sonitpur and Morigaon and other official staffs
Nos. of participants	67	64

Dr. C.V. Mohan, Principal Scientist, WorldFish, Malaysia, and Dr. Baishnaba Charan Ratha, Senior Nutrition Specialist served as the Resource Persons for the workshop. Dr. B.K. Bhattacharjya, Principal Scientist & Head, ICAR-CIFRI, Guwahati, Dr. Chayan Kr. Acharjee, Deputy Director of Fishery, Dr. Binod Kalita, Dean (I/C), CoF, Raha, Dr. Pranja Pratim Sharma, Member, Assam Agriculture Commissioner, Dr. Dandadhar Sarma, Prof. Dept of Zoology, Guwahati University, Ratul Sharma, AFIO, DoF served as Chief Guest for the workshop.

The workshops were coordinated by Dr. Dhruvajyoti Sharma, Nodal Officer, APART and Dr. Sanjay Sarma, Fisheries Coordinator, ARIAS Society, Mr. Bhaskar Jyoti Natha, DFDO, Morigaon and Mr. Anuwar Hussain Khan, FDO, Morigaon, Assam. The list of participants of the Workshop is annexed in the report (annex. 2).

Dr. Dhruvajyoti Sharma, Nodal Officer, APART and Dr. Sanjay Sarma, Fisheries Coordinator, ARIAS Society initiated the daylong workshop program and welcomed all the participants present in the workshop and facilitated the dignitaries with a phulam

gamusha. Dr. Dhruvajyoti Sharma, then explained the background and objectives of the workshop.

In the beginning talk on topic “Aquatic Food Systems for Healthy People and Planet”, Dr. Chadag Vishnumurthy Mohan, Principal Scientist Aquaculture, WorldFish, Malaysia briefly explained about WorldFish vision and missions to “end hunger by 2030 through science to transform food, land and water systems under threat of climate change.” Within One CGIAR and the wider global agricultural research agenda, WorldFish has a unique research mandate that focuses on the role and contributions of aquatic food systems to the 2030 SDGs.

Dr. Mohan told that, over the past 45 years, WorldFish has firmly established itself as a global leader in research and innovation in sustainable aquaculture and fisheries. Globally, aquaculture is the world’s fastest growing food production sector, and fish and aquatic foods are the most traded food commodity. Our work plays a critical role in realizing their potential for sustainable development in low- and middle-income economies.

He also highlighted the Global prospective of the food and nutrition security by mentioning that approximately 12% of the global population was severely food insecure, between 720 and 811 million people in the world faced hunger in 2020 and 2.37 billion people did not have access to adequate food. He mentioned, based on the State of food security and nutrition in the World, 2021, 22% affected by stunting, 6.7% suffering from wasting and 5.7 % were overweight.

Fish and aquatic foods are the main animal-source food consumed by more than a billion “fish dependent” people. They are an irreplaceable source of micronutrients, essential fatty acids and high-quality protein for the most vulnerable, particularly for supporting cognitive development in the first 1000 days of a child’s life in many of the world’s lowest-income countries in Africa, Asia and the Pacific.

He said that when fish particularly small fish consumed as part of a balanced diet, fish can increase the absorption of essential minerals such as iron and zinc from other foods. The head, viscera and backbones, which make up 30 to 70 percent of the fish, have the highest concentration of micronutrients, but often are the less valued and preferred parts by consumers. Consumer preferences for fish and aquatic food vary according to a range of factors.

He shared that WorldFish is working with different partners at state and national level to achieve sustainability and end malnutrition in the country. He also highlighted nutrition promotion activities being carried out in Odisha by WorldFish

Finally, in his speech, Dr. Mohan expressed that fish particularly small fish are the “Super Food” which are rich in multiple highly bioavailable essential micronutrients and when eaten whole are highly nutritious and contribute a wide range of micronutrients that benefit the health of women, pregnant and lactating women, adolescent girls and children. At the end of the presentation, he gave key messages by expressing that the

National food and nutrition, agriculture and health policies must include actions to increase the access to and intake of micronutrients-rich fish species from inland waters.

Dr. B.K. Bhattacharjya, Principal Scientist & Head, ICAR-CIFRI, Guwahati, shared his research experiences and the importance of fish & other aspects to sustainable development of the fisheries sector in Assam. He then presented a detailed presentation highlighting the fish diversity records of Northeast India, fisheries and Aquaculture resources of Northeast, Resources, production and consumption of fish in northeast, the nutritional value of different indigenous and small fishes found in North-East. He then showed a detailed data of the biochemical composition of small indigenous fishes studied by ICAR-CIFRI. He also presented the data of the macro and micro mineral content of the Small Indigenous Fishes.

Dr. Dharitri Baruah, Technical Coordinator, WorldFish Assam, discussed the current fisheries situation in Assam as well as the history of fishing. She just gave an brief background on the history of fisheries and aquaculture development in India. She stated that Assam's current fish production is 4.17 lakh MT, the demand-supply imbalance is 0.91 lakh MT, and per capita consumption is 12.30 kg/yr (at 90% fish eating population). She also discussed the advantages of fish cultivation and consumption.

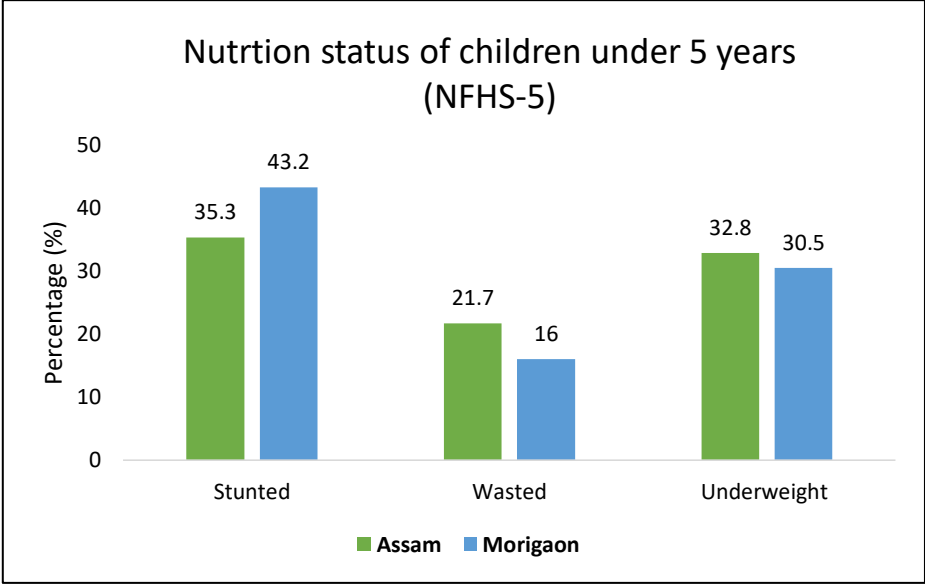


Figure 5. Comparison of nutrition status of children in Morigaon and Assam

Dr. Baishnaba Charan Ratha, Senior Specialist, Nutrition and Public health, WorldFish started his session by showing a video related to issues of Malnutrition in India. He then presented a detailed presentation where he highlighted the malnutrition data of Assam and Morigaon block as per the latest National Family Health Survey (NFHS-5) where 43.2% of children under the age of five years are stunted or too short for their age, 16.1% are wasted or too thin for their height and 30.5 % are under weight. He also shared the data on Anaemic of women and children where 71.8% (Age between

15-19 women) and 64.2% (Age between 15-49 women) and children's up to 59 months 53.3% anaemic. Then, he explained and discussed in detail regarding the nutrition status, type of malnutrition, cause, consequences, and impact on whole life of family members and their economy. Then, he urged the need of nutritious balanced diet and role of small fish for human health within diversified diet of human being, particularly for women and children.

During the workshop, Dr. Ratha mentioned that Small fishes like moa (mola), puthi (*Puntius spp*), boliora (*Aspidoparia spp*) dorikona (*Esomus danricus*), prawn, and kholihona (*Colisa fasciatus*) are abundantly available in all the water bodies of Assam and are micronutrient-rich, especially when eaten whole with the head, bones and viscera. They are also rich in essential nutrients, such as vitamin A, vitamin B12, iron, calcium, zinc and essential fatty acids, which are important for growth and development in young children. He elaborated and explained about the importance of 1000 days of human life and mentioned that small fish improves nutrition of pregnant and lactating mothers as well as young children during the critical first 1000 days of child development.

Dr. Ratha then, shared his Odisha work experiences working in convergence with WCD&MS on Fish Based Nutrition in ICDS Supplementary Nutrition Programme (SNP), In a pilot program fish powder fish powder was included in hot cooked meal of children feeding in Aganwadi center (AWC) and dried small fish was given as take home ration (THR) to pregnant & lactating women & adolescent girls. Under the program even community as well as ICDS functionaries were trained using different SBCC materials.

He mentioned WorldFish team had completed 47 nos of program in 11 Districts with a total more than 2500 participants including mothers, pregnant and lactating women, adolescent girls, children, caregivers, community members, fish farmers, ICDS staff, ASHA workers, APART field staff and community resource persons.

At the end of the presentation, he mentioned about the awareness & demonstration and pilot of fish-based nutrition promotion program conducted by WorldFish under APART and its objectives of the program. Dr. Ratha shared the experience of pilot programme initiated by Social Welfare Department at Chaygaon block, Kamrup district that is Matsya Paripusti – An innovative pilot on fish-based nutrition in ICDS Supplementary Nutrition Programme by Government of Assam, India. The pilot was carried out for 3 months from mid-September-mid December 2022 by district social welfare department as a part of Poshan Maah celebration. Under this pilot, fish powder was included in the diet of over 7000 children aged 3-6 years from 293 Anganwadi centres.

Pranjal Prakash Sharma, Assam Agriculture Commission Member, talked on the importance of eating fish and vegetables and the importance of a diverse diet to achieve good nutrition.

Dr. Binod Kalita, (i/c) Dean, College of Fisheries, discussed with the participants regarding the availability of the hygienic dried fish, dried fish product and the ways for the promotion of more of hygienically dried fish. He then explained nutritional benefits of hygienically dried fish. He also talked about the interventions taken up by the College of Fisheries, Assam Agricultural University, Raha. He then described and talked about the 4 solar mechanical driers installed by College of Fisheries, Raha in two districts - Baksa and Barpeta for hygienic dried fish production.

Small fish-based nutrition promotion theme video song on the benefits of small fish consumption, produced by WorldFish for APART project was released by internationally reputed fishery scientist during the workshop. The video was also played and displayed during the workshop for all the participants.



Mr. Ratul Sharma, Fishery Information Officer, at the end of the meeting delivered the vote of thanks.



Zonal workshop held at Conference Hall, AAU, Khanapara, Guwahati



Zonal level workshop, Dalbari, Morigaon

IV. State Level Workshop on benefits of fish based nutrition for Human Health

A one-day state level workshop on benefits of fish based nutrition to human health to support fisheries interventions under APART was organized by WorldFish in collaboration with the Department of Fisheries, and Assam Rural Infrastructure & Agricultural Services (ARIAS) Society, Govt. of Assam under the World Bank funded APART Project on 23rd September, 2022 at the Kaziranga Hall, Indian Institute of Bank Management (IIBM), Khanapara, Guwahati, Assam.

The workshop's main objectives were to create awareness to build a comprehensive overview of the potential role of small fresh fish and small dry fish in improving nutrition with respect to certain micronutrient deficiencies in throughout the Assam.

Dr. Shakuntala Thilsted, Global lead, Nutrition expert, WorldFish served as Resource Person for the workshop. The workshop was attended by Smt Roshni Aparanji Korati, IAS, State Project Director (SPD), Dr. B.K. Bhattacharjya, Principal Scientist & Head, ICAR-CIFRI, Guwahati, Mr. Sanjib Choudhary, Joint Director of Fisheries, Dr. Chayan Kr. Acharjee, Deputy Director of Fishery, Dr. D.J. Sharma, Nodal Officer, OPIU, Fishery, Dr. Sanjay Sarma, Fishery Coordinator, ARIAS Society, Dr. Baishnaba C. Ratha, Senior Nutrurion Specialist, WorldFish, Dr. Dipesh Debnath, Sr. Scientist, ICAR-CIFRI, Dr. Sona Yengkokpam, Sr. Scientist, ICAR-CIFRI. DFDOs and FDOs from Department of Fisheries, Senior Scientist, ICAR-CIFRI, NFDB representative, Block Development Officer, Technical Coordinator, WorldFish, Technical Expert Fisheries (TEFs) and Engineer Consultant Fisheries of APART Project Districts, FPC members, GIZ representatives, NGOs, College of Fisheries representatives, Beneficiaries of APART and some of the progressive fish farmers were the participants of the Workshop. The list of participants of the Workshop is annexed (Annex.3) in the report.

Dr. Dhruvajyoti Sharma, Nodal officer, APART, Directorate of Fisheries, Assam initiated the session with a welcome address and explained the background and objectives of the workshop.

Dr. Shakuntala Thilsted, Global lead, Nutrition expert, WorldFish presented extensively on aquatic food systems for nourishing people and planet to support APART fisheries interventions during the technical session. She began by describing the situation of world hunger and malnutrition, the importance of aquatic food systems for sustainable development with relation to feeding a nation, and the approaches to aquatic food systems that are nutrient-sensitive. She also discussed the global outlook for food and nutrition security, stating that approximately 12% of the global population was severely food insecure, 828 million people faced hunger in 2021, and 3.1 billion (2020) people did not have access to adequate food. According to the State of Food Security and Nutrition in the World, 2021, 22% of children were stunted, 6.7% were wasting, and

5.7% were overweight. She forecast that roughly 670 million people will still be hungry in 2030 was then presented.

Dr. Shakuntala Thilsted also stated that aquatic food systems have the potential to contribute to social, environmental, and economic development in a holistic manner for sustainable development. According to the Food System Summit (FSS), by 2021, global food systems will have transformed to achieve sustainable development through increased nutritional diversity in aquatic foods, as well as carbon sequestration in marine and freshwater environments. She stated that food system transformation is incomplete without the inclusion of aquatic foods. As a result, aquatic foods will be included in the UNFSS 2021 follow-up, such as School Meals; Nutrition, Health, and Education for Every Child; and Food-based Safety Nets. She continued to explain about aquatic foods. Aquatic foods, according to WorldFish, are primarily animal, plant, and microorganism farmed in and harvested from water (obtained from diverse aquatic environments such as oceans, lakes, floodplains, rice fields, and so on), as well as cell and plant-based foods emerging from new technologies. She also stated that approximately 3.3 billion people worldwide consume aquatic foods, and roughly 800 million people rely on aquatic food systems for their livelihoods and income.

Dr. Shakuntala Thilsted said that Aquatic Foods are Superfoods because they contain highly bioavailable micronutrients and essential fatty acids. They also benefit socio-economically in terms of livelihood and income, women and youth engagement and capacity building, and environmentally in terms of ecology rehabilitation and low environmental cost. She also gave a brief overview of approaches used in the nutrition-sensitive aquatic food system, including diversifying consumption of aquatic foods, enhancing diversity in the supply chains and production of aquatic foods, incorporating aquatic foods into national and state policies, and involving women and young people in the aquatic food system. She also explains how to increase production diversity through the polyculture of small and large fish, combined aquatic-terrestrial production systems, and creative supply chain solutions like solar dryers and freezers.

Smt. Roshni Aparanji Korati, IAS, State Project Director (SPD), ARIAS Society expressed her gratitude to Dr Sakuntala as she overviewed the role of fish in human nutrition. Additionally, she stated that though the production of fish meet the demand of Assam, fisheries still need to do more to increase the production for export earning as well as to prepare other value added product.

A Recipe Booklet on Small Fish of Assam was released by internationally reputed fishery scientist during the workshop.

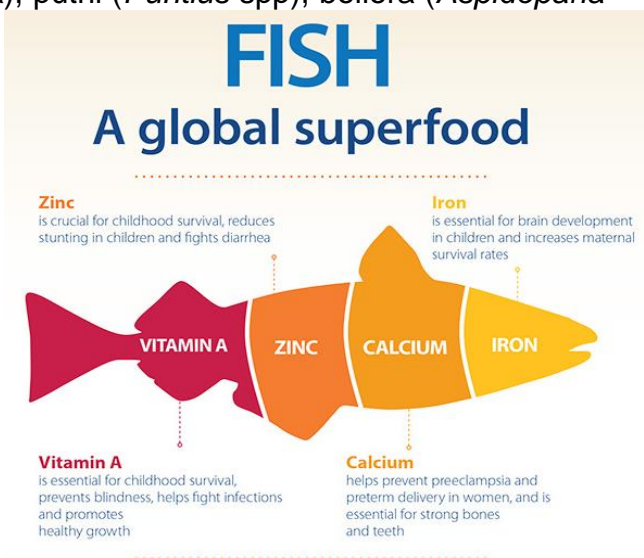
Dr. B.K. Bhattacharjya, Principal Scientist & Head, ICAR-CIFRI, Guwahati, shared his diverse research experiences as well as the importance of fish and other aspects to the sustainable development of the Assam fisheries sector. He then gave a detailed presentation on the fish diversity records of Northeast India, the Northeast's Fisheries and Aquaculture resources, the resources, production, and consumption of fish in the Northeast, and the nutritional value of various indigenous and small fishes found in the

Northeast. He then presented detailed information on the biochemical composition of small indigenous fishes studied by ICAR-CIFRI. He also discussed the macro and micro mineral content of Small Indigenous Fishes.

Dr. Dipesh Debnath, Senior Scientist, ICAR-CIFRI, Guwahati, gave a brief overview of fish resources, production, and consumption in Northeast India. Then he talked about feed, feed management, different types of feed, formulation methods and feed composition. He also discussed the feeding device.

Dr. Baishnaba Charan Ratha, Senior Specialist, Nutrition and Public Health, WorldFish, in his presentation provided a brief on the nutrition status of the state based on the report provided by the National family health survey (NFHS-5). Based on the NFHS-5 report, 35% of the children under age 5 are stunted, 22% are wasted, 9 % of children are severely wasted, and 32% are underweight. Both malnutrition and anaemia are high among rural women and children and its consequences in long term in state of Assam. He discussed the importance of diversified balance diet for women and children, particularly during first 1000 days of child life, because in the first 1,000 days of a child's life, which encompasses pregnancy and the first two years after birth, the child's physical and mental growth is rapid.

Dr. Ratha said, small fishes like moa (mola), puthi (*Puntius* spp), boliora (*Aspidoparia* spp) dorikona (*Esomus danricus*), prawn, and kholihona (*Colisa fasciatus*) are abundantly available in all the water bodies of Assam. More than 90% of people in Assam consume fish. The small fishes when consumed whole, provide maximum nutritional benefits since it is rich in micronutrients like vitamin A, zinc, iron, etc. So, the state like Assam, to promote small fish consumption is a better option for women and children, particularly in first 1000 days of child life. He also discussed about the difference between eating small and large fish.



Then, he shared ICDS pilot experiences in Odisha, where hygienic small fish powder and dried small fish incorporated in SNP programme for consumption of children, pregnant women, lactating mother and adolescent girls and other efforts by WorldFish to do trials for including small fish-based products in school's mid-day meal and tribal residential. School like KISS in Bhubaneswar.

Following that, he discussed the successful efforts by WorldFish and APART to organising 44 numbers of awareness cum demonstration programme on benefits of

small fish consumption and small fish-based nutrition promotion programme in different part of Assam under World bank supported APART project.

Dr. Sanjay Sarma, Fishery Coordinator, ARIAS has shared his experienced about the pilot programme and incorporation of dried small fish powder in hot cooked meal of two anganwadi centers at kamrup districts (No. 2 kukurmara anganwadi center and doloipara anganwadi centre).

A brief talk on the availability of hygienically dried fish, dried fish products, and strategies for promoting the consumption of more hygienically dry fish was given by Mr. Inam A. Hussain, Assistant Professor, COF, Raha. He continued by outlining the nutritional advantages of clean, dried fish. Additionally, he discussed the initiatives undertaken by the College of Fisheries by the Assam Agricultural University, Raha. The four solar mechanical driers erected by the College of Fisheries, Raha in the districts of Baksa and Barpeta for hygienic dry fish were then discussed.

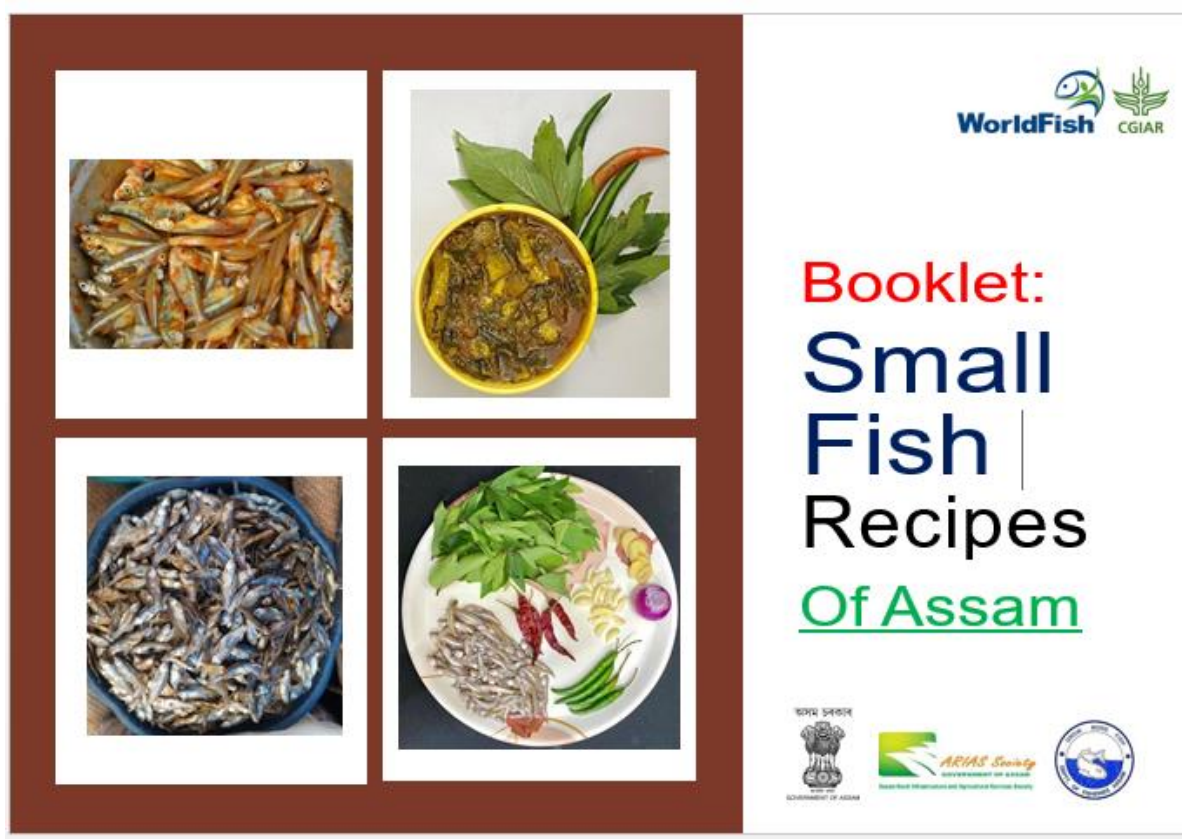
The workshop ended with vote of thanks from the Mr. Ratul Sarma, Fisheries Development Officer, Directorate of Fisheries, Govt. of Assam.





V. Development of Small Fish recipe book

Based on the interactions and discussion with the communities during awareness programs, information collected on different methods of preparation followed by the communities and the products prepared and evaluated during the piloting and demonstration programs, WorldFish team attempted to compile the small fish recipes in the form of a recipe booklet. This small fish recipe booklet describes small fish-based recipes prepared using fresh small fish, hygienically dried small fish and dried fish powder. The link for the recipe book is <https://hdl.handle.net/20.500.12348/5274>



Outcome and influence

1. Participation in State level nutrition workshop by WCD

The series of awareness programs to promote fish consumption among vulnerable communities, children, adolescent girls, pregnant and lactating mothers conducted in 12 districts of Assam under APART project influenced the State Social Welfare Department, Government of Assam, to invite WorldFish to participate in the two days state level nutrition workshop cum capacity building program. The program was organised in collaboration with UNICEF. The workshop objective was to launch Matrisneh (Mother's Love) Programme – an initiative to prevent malnutrition in the State of Assam,

The workshop was held at the Conference Hall of the Social Welfare Board, Beltila, and Guwahati on 29th to 30th July 2022. The meeting was attended by more than 100 participants including District Social Welfare officers, Child Development Project Officers, Members of the State Resource Pool, District Co-Ordinator POSHAN Abhiyaan and State Directorate staff.

As a part of agriculture-sensitive initiatives to tackle malnutrition in the State, through APART, WorldFish was invited to participate to explain on Nutritional Enhancement through Fish to prevent malnutrition. In the beginning of the session, Dr. Sanjaya Sarma, State Coordinator, APART was explained about fish product status in Assam and toughed on all our efforts to popularize the small fish for better health both in Odisha and Assam within 40 minutes of the restricted one-hour session.

Then Dr. Baishnaba Charan Ratha, Senior Specialist, Nutrition and Public Health at WorldFish during his presentation described World Fish's preliminary efforts of inclusion of nutritious small fish in 23 schools MDM and KISS, Bhubaneswar Odisha before MoU signing and six months of pilot study experiences in 50 Anganwadi centres of tribal-dominated Mayurbhanj district of Odisha. Dr. B.C.Ratha shared the experiences of all training, awareness cum demonstration program success in different parts of Assam and focussed discussion more on freshwater locally available small fish and its scope to include ICDS SNP programme in the fish eater State like Assam. Hence, during the short question-answer session, He clarified with all evidence how small fresh/dried fish powder preparation process is very simple to make at the household level with the use of an electric or handmade grinder by a mother or caregiver of children.

Then Dr.Ratha explained, under ICDS diet diversification initiatives, the inclusion of nutritious small fish, particularly small fish in 'powder form' can be adopted as one of the best practices to support for combating malnutrition in the State of Assam. Assam has a good potential of freshwater fish including small fish like mola and other species

in natural sources like rivers, wells and other freshwater aquaculture activities in the State. So, there is a lot of business opportunity for Women Self-help Group, Farmers Producer Group/Company to increase their income through producing value-added fish-based products to available both in the ICDS SNP programme and open market.

Finally, Dr. Ratha briefed, small fish-based nutrition can be a good option to include it as a part of the diversified diet of women, adolescent girls, and children under ICDS/School SNP programme in state. So, messages were in summary below:

- Small Fish: Super Food Rich in Multiple Highly Bioavailable Essential Micronutrients.
- Recognize the unique and irreplaceable role of fish as a superfood, especially in the first 1,000 days of life and for the poor.
- ICDS Best practices. Fish powder making process & consumption of young children above 6 months in the household level. WorldFish can provide technical support to prepare fish powder-making process in the household level through demonstration.
- Preparation of more SBCC materials on fish-based nutrition as per the requirement of different beneficiaries.
- Discussion on fish consumption benefits for human health in monthly Village Health Sanitation and Nutrition Day (VHSND) in AWC level.
- Discussion during home visits by ICDS staff and regular Mothers Meeting/Community Level Meeting.
- Include a training session on the benefits of small fish for human health in Job Course/Refresher training of ICDS staff.
- Fish powder inclusion in Nutrition Rehabilitation Centers (NRC) for Severe Acute Malnutrition (SAM) children.

Before leaving the venue, Mr. Bibhash Modi, ACS, Director, Women and Child Development cum state Project Director, POSHAN Abhiyaan expressed his satisfaction with all our interventions organized in a different part of Assam. Both Dr. Sanjaya Sarma and Dr. Baishnaba Ch. Ratha requested him for a meeting to discuss further courses of action to include fish-based nutrition intervention in the regular ICDS SNP programme of State. Team also met Dr. Shweta Sharma, Nutrition Specialist, UNICEF Assam and discussed all WorldFish nutrition interventions in Assam.



2. Use of WorldFish experience from Odisha to influence the Assam government

WorldFish has global experience working with different partners to promote benefits of fish consumption for human health. WorldFish successfully implemented 6 months pilot to include small fish-based products in Supplementary Nutrition Program of ICDS in Odisha state of India during 2021. Under this pilot program 2000 children, adolescent girls, PLW were included. Fish powder was included in regular meals of children and dried fish were given to AG and PLW as THR. Several steps were followed by WorldFish to convince the Odisha government to accept fish in Supplementary Nutrition Programs (SNP) of ICDS.

- Promote nutrition sensitive carp mola polyculture in backyard and community ponds.
- Trial of fish powder in regular curry of Kalinga Institute of Social Science (KISS), Bhubaneswar and taste by management staff and children for acceptability.
- Inclusion of fresh small fish in 13 special schools and 11 childcare institutions covering 2336 children in Odisha.
- Fresh fish inclusion in KISS mega kitchen for a period of 6 months where more than 27000 tribal children consumed fish in their regular diets.
- WorldFish received invitation for several district and state level workshop to share the experience and subsequently became a member of Technical Expert Advisory Group on Nutrition (TAG) WCD & MS Department.
- The experience from school feeding program and KISS program helped the project in developing the confidence among women and child development department to include the fish in ICDS program.
- The project trained all the ICDS and health staff in the pilot area on inclusion of small fish-based product in ICDS programs.
- Successful piloting of fish-based products in SNP program in 50 AWC of Kaptipada block, Mayurbhanj Odisha.

This experience of working with community, fisheries and ICDS staff, various government departments in Odisha helped WorldFish to follow similar steps in Assam with little contextualisation to encourage government of Assam to include fish in ICDS program. This paved the way for launching a pilot called Matsyaprusti by Kamrup district administration, Government of Assam.

3. Support to Farmer Producer Companies (FPCs) for production of hygienic dried fish powder

Fish powder for the pilot program was supplied through a Farmers Producer Company (FPC) under APART in collaboration with local NGO. The project trained FPCs for production of hygienic dried fish powder using locally available, nutrient dense indigenous small fish species. The fish powder used in the pilot program was prepared using local indigenous small fish Mola (approx. 75%), puntius and other small indigenous fish. The project and partners ensured that the FPC follows the standard operating procedure for obtaining / producing hygienic, nutritious, and safe dried fish product. Each batch of final product was subjected to Food Standards and Safety Authority of India (FSSAI) regulation. The appropriate packaging with labelling as per FSSAI standards was followed.

Complete nutritional profile of dried fish used in the ICDS hot-cooked meal scheme was analysed by College of Fisheries Assam Accredited Laboratory.

Products were packed in plastic air tight containers with labelling and certifications. The FPC supplied the certified, hygienic dried fish powder to all the selected AWC twice in a month.

Feedbacks from FPC

- FPCs gained experience through training for production of dried fish powder
- FPCs realised that FSSAI certification is important for the product to be accepted by the government as well as open market and also to get a better price in the market
- FPC is able to gain income from the production of hygienic dried fish/ powder
- A suitable business model need to be developed to include more number of FPCs in the production
- Increasing the production can be helpful to reach more number of schools/ICDS
- Need more training and exposure for preparation of different types of fish based products



4. Launching pilot project “Matsya Paripusti”

HIGHLIGHTS

- Government of Assam started an innovative pilot program - ‘Matsya Paripusti’ under the ICDS Anganwadi Supplementary Nutrition Programme on 8th September 2022 to help in reducing undernutrition menace in Assam.
- Fish powder prepared from locally available small fish from rivers and beels has been used under this pilot.
- This pilot program was implemented by a consortium of partners including the World Bank funded APART Project of ARIAS Society, Government of Assam, Departments of Fisheries and Social welfare, Government of Assam and District Administration of Kamrup District with technical support from WorldFish and College of Fisheries, Raha.
- Local Farmer Producers Companies (FPC) were trained to prepare and supply large quantities of hygienic and nutrient-rich fish powder.
- Fish powder was certified by the Food Safety and Standards Authority of India.
- The pilot program was conducted for 3 months duration (Mid-September – Mid December 2022) in Kamrup district of Assam with a target beneficiary population of 7,000 children between the ages of 3 and 6 enrolled in 293 Anganwadi Centers.
- ‘Matsya Paripusti’ has multifaceted outcome targets by addressing Sustainable Development Goals of Zero Hunger, Good Health and Wellbeing.

Under the project, 51 numbers of awareness cum demonstration program conducted in 12 districts of Assam to promote small fish consumption among children, AG and PLW, influenced and encouraged the Kamrup district officials to include small fish in the ICDS Supplementary Nutrition Program during Poshan Maah celebration during September 2022. Series of meetings were held with District Social welfare Officers, District Fisheries officials, APART team, College of Fisheries to prepare the SoP and implementation of the pilot program. The pilot project was sponsored by Indian Oil Corporation Limited and implemented by the Department of Fisheries, Department of Social Welfare and the ARIAS Society and District Administration of Kamrup District with hands-on technical support from WorldFish and College of Fisheries, Assam Agricultural University, Raha.

Pilot Site

District Social Welfare Office, Kamrup Rural, Assam (under Department of Women and Child Development) identified the ICDS project and beneficiaries for inclusion in the pilot program. They also ensured the supply chain of product up to AWC level, consumption of fish product and overall monitoring of the project with support of APART and WorldFish staff. The pilot was successfully implemented in 293 Anganwadi centers spread throughout the Chaygaon block of Kamrup district, Assam with a beneficiary population around 7,000 children between the ages of 3 and 6.

Launch of the pilot program

India celebrates POSHAN Maah (nutrition month) across the country in September of every year. Poshan is a multi-Ministerial convergence mission for propagating holistic nutrition through the ICDS Anganwadi Supplementary Nutrition Programme (SNP). The SNP is among the major services under the ICDS which aims to improve the health and nutrition of children aged 6 months to 6 years, as well as expectant and lactating women. The Government of Assam is promoting nutrition by providing hot cooked meal to children which is supplied through various Anganwadi Centers located across the state.

The pilot program was named 'Matsya Pariprusti' and implemented by District Social welfare Department Kamrup district, Assam. On 8 September 2022 the pilot project was launched in Kukurmara Anganwadi Centre in Chaygaon block of Kamrup district, Assam under Poshan which entails the inclusion of dried small fish powder in the ICDS SNP. The major aim of "Matsya Paripusti" is to improve the dietary diversity and micronutrient intakes of children aged 3-6 years through hot cooked meals and comprehend the acceptability of small fish powder (e.g., taste) with pre-school children.

The programme was launched by Smt. Keerthi Jalli, IAS, Deputy Commissioner, Kamrup District, Assam in presence of Smt. Shehnab Sahin, ACS. Assistant Commissioner, (In charge DSWO) Kamrup, CDPO and BDO Chaygaon block, Senior Fisheries officers of Dept. of Fisheries, Faculties of College of Fisheries, WorldFish, Farmers Producers Company (FPC), NGO, and ICDS field staff participated in the programme.

During the launching, Smt. Keerthi Jalli, IAS, Deputy Commissioner, Kamrup District, Assam expressed her happiness for an innovative initiative in Poshan month, to include locally available small fish powder in ICDS supplementary Nutrition Programme in Kamrup district. Because Fish, especially small fish are a highly nutritious animal-source food which contributes a wide range of micronutrients that benefit the health of women and children. She also emphasized including small fish powder, other food items like chutneys such as sesame seed chutney, tomato chutney, curry leaves chutney, and garlic chutney for pregnant women in order to overcome deficiency of iron and anaemia.

Smt. Shehnab Sahin, ACS. Assistant Commissioner (In charge DSWO) Kamrup discussed about the importance of a balanced diet for a healthy life and the role of micronutrient intakes involving small fish powder for pregnant, lactating mother and young children. She expected a good acceptance among the children across the project. Because small fish has contained various sources of micronutrients such as iron, zinc, calcium, vitamin A, B12, Omega -3 fatty acids, iodine, and protein, which are very important for nutritional gain of women and children, particularly first 1000 days of human life. She thanked the Fisheries department, College of Fisheries, WorldFish, FPC and local NGO for supporting ICDS to implement the pilot programme in Kamrup district.

Dr. Sanjay Sarma, Fishery Coordinator (APART) in his speech told that the availability of small fishes is so high in state of Assam. First time, Fisheries department has taken

initiative to produce hygienic certified small fish powder through support of Farmers Producers Company (FPC) under World bank funded APART project. He assured the availability of small fish powder for longer time, if the pilot extended for more months for consumption of young children. He expressed his satisfaction to be a part of such important programme.

The outcome of the pilot project is multifaceted by specifically addressing Sustainable Development Goals 2 and 3 – Zero Hunger, Good Health and Wellbeing.

Entitlements under the pilot program

During the feeding programme, 5 g of small fish powder per child per day was served, twice in a week for a period of 3 months from mid-September to mid December 2022. The fish powder was mixed with regular vegetable khichdi (mixed vegetable porridge) at AWC level and served to children aged 3-6 years during the pilot period.



Observations and feedback

- Project trained ICDS staffs and supervisor and in turn they trained mothers/caregivers at community level. In the process, we could observe increased awareness and involvement of ICDS staff in delivering the nutrition messages and implementation of the program.
- All the AWCs strictly followed the hygienic measures during preparation of the meal.
- Mothers/caregivers who had relatively younger children accompanied during the feeding program and served the children (vegetable mix khichdi).
- Lemon juice were added additionally as a source of vitamin C and to enhance taste.
- Some of the mothers/caregivers preferred to add the sesame seeds to the meal as a practice and source of calcium since its abundantly available.

- Plate waste was minimal or not there. Hence, mothers and caregivers expressed their happiness on inclusion of fish powder in the meal.
- Since freshwater small fishes used for preparation of powder the odour was relatively less and accepted well by children.



Kamrup District Awarded as a Best Practice during Poshan Maah 2022, Assam by Dept. of social Welfare, govt. of Assam

Way forward and conclusion

The momentum built as part of this APART project activity needs to be sustained and continued. This will be possible only through integration and embedding of the lessons learned and SOPs developed in the ongoing programs and activities of departments like Department of Social Welfare and programs like ICDS in Assam. It is recommended that a consortium of partners come together in a convergence mode and continue series activities that were implemented under the APART project to harness the human health benefits of aquatic foods for vulnerable communities. Such an approach will have immense long term benefits in a state like Assam which is blessed with diverse sources of aquatic foods including small indigenous fishes.

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Annexures

Annexure-1: Small Fish recipes prepared during demonstration program

1A. Small fish paste

Method of preparation:

- Collect good quality fresh small fishes from pond, beel or from the market.
- Clean the small fish well and wash properly, then put the required turmeric and salt immediately
- Roast fresh/dried small fish with mustard oil for 10-15 minutes over low heat
- Cool the roasted fish for 5 to 10 minutes
- Grind with a locally available mixy or grinder, prepare fish paste and keep it in a clean container with a lid.
- Include it in any regular curry of children in household level.



1B. Small fish powder

Method of preparation:

- Collect good quality fresh small fishes from pond, beel or from the market or dried small fish from market.
- Clean the small fishes well, remove the gut and wash properly. Head portion must be retained while cleaning the small fishes.
- Fry the small fishes without oil for 10-15 minutes over low heat
- Allow the fried fishes to cool for 5-10 minutes
- Prepare fish powder with a locally available grinder or mixer and store it in a clean airtight container with lid
- After light fry of fish powder with mustard oil, include in regular curry of children in household level.



2. Preparation of fresh/dried small fish soup

Ingredients:

- Fresh/dried fish powder-250g
- Cooking oil-80ml
- Small-sized onion sliced
- Ginger paste-1 tablespoon
- Garlic paste-1 tablespoon
- Turmeric powder-1 tablespoon
- Cumin powder-1/2 tablespoon
- Coriander powder-1/2 tablespoon
- Fish masala powder-1/2 tablespoon
- Garam masala-1/2 tablespoon
- Jeera powder-1/2 tablespoon
- Dhania powder-1/2 tablespoon
- Chilli powder-1/2 tablespoon
- Fresh chilli-3-4 as required
- Small tomato chopped
- One small sized cabbage
- Salt as required
- Black pepper 1/2 tablespoon
- Corn flour 2 tablespoon
- One bunch of coriander leaves (for better flavour)



Method of preparation:

- Heat oil in a pan add small-sized onion sliced, fresh chilly sliced, ginger, garlic paste and sauté for a few min.
- Add chopped tomatoes, cabbage, and cook until the oil separates from the mix
- Add turmeric powder, cumin powder, coriander powder, fish masala powder, jeera powder, dhania powder and chili powder, salt and saute for 2 min
- Add fish powder and cook for a few min.
- Add some hot water
- Add Cornflour
- Add black pepper
- Add garam masala and coriander leaves
- Cook for 30 min and just before turning off the heat, add a few coriander leaves (for better flavour)



3. Preparation of mixed vegetables with small fish curry

A popular traditional Assamese meal is "xakor logot horu mass," which consists of mixed vegetables with small fish.

Ingredients:

- Fresh fried small fishes-250g
- Cooking oil- 100ml
- Onion sliced- 3 medium-sized
- Ginger paste-1 tablespoon
- Garlic paste-1 tablespoon
- Turmeric powder-1/2 tablespoon
- Garlic paste- 1 tablespoon
- Ginger paste-1 tablespoon
- Turmeric powder-1/2 turmeric powder
- Fish masala powder- 1/2 tablespoon
- Garam masala-1/2 tablespoon
- Jeera powder-1/2 tablespoon
- Dhania powder-1/2 tablespoon
- Red chili powder-1/2
- Potato chopped-150g
- One Cabbage-500g
- Tomato-100g
- Brinjal-150g
- One small size bottle gourd
- Salt as required
- leafy vegetables
- One bunch of coriander leaves (for better flavour)



Method of preparation:

- Wash, cut all vegetables and keep them aside.
- Heat oil in a pan adds small sized onion sliced, ginger-garlic paste and sauté for a few minutes.
- Add mixed vegetables tomato, brinjal, bottle gourd, cabbage and cook until the oil separates from the mix.
- Add turmeric powder, coriander powder, fish masala powder, cumin powder and chili powder, jeera powder, dhania powder, salt and saute for 2 min
- Add small fish and cook for some time.
- Add garam masala and coriander leaves
- Add hot water and cook for 45 min just before turning off the heat, add a few coriander leaves (for better flavour).

After 30 min of cooking “mixed vegetable with small fish or xakor logot horu mass” ready to serve.



4. Preparation of mixed vegetables with small fish powder curry

In the pilot programme area, the small fish powder was mixed with vegetable curry and served to all the participants. Ingredients are given below-

Ingredients:

- Fresh small fish powder- 250g
- Mustard Oil- 100ml
- one medium-size onion chopped
- Garlic paste- 1 tablespoon
- Ginger paste-1 tablespoon
- Turmeric powder-1/2 turmeric powder
- Fish masala powder- 1/2 tablespoon
- Garam masala-1/2 tablespoon
- Jeera powder-1/2 tablespoon
- Dhania powder-1/2 tablespoon
- Red chilli powder-1/2
- Potato chopped-150g
- One Cabbage-500g
- Brinjal-150g
- One small size bottle gourd
- Salt as required
- leafy vegetables
- One bunch of coriander leaves (for better flavour)



Method of preparation:

- Wash, cut all vegetables and keep aside.
- Heat oil in a pan add small sized onion sliced, ginger and garlic paste and sauté for few min
- Add mixed vegetables tomato, brinjal, bottle gourd, cabbage and cook until the oil separates from the mix
- Add turmeric powder, coriander powder, fish masala powder, cumin powder and chilli powder, jeera powder, dhania powder, salt as required and saute for 2 min
- Add fresh small fish powder and cook for some time.
- Add garam masala, coriander leaves
- Add hot water and cook for 45 min just before turning off the heat, add a few coriander leaves (for better flavour).

5. Preparation of dry fish with pea and tomato

Ingredients:

- Dry small fishes-150g
- Cooking oil- 60ml
- Onion sliced- 1 medium-sized
- Ginger paste-1/2 tablespoon
- Garlic paste-1/2 tablespoon
- Turmeric powder-1/2 tablespoon
- Garlic paste- 1 tablespoon
- Ginger paste-1 tablespoon
- Turmeric powder-1/2 turmeric powder
- Fish masala powder- 1/2 tablespoon
- Garam masala-1/2 tablespoon
- Jeera powder-1/2 tablespoon
- Dhania powder-1/2 tablespoon
- Red chilli powder-1/2
- Salt as required
- Pea – 500g
- Tomato- 150g

Method of preparation:

- Wash all peas and tomatoes and keep them aside.
- Heat oil in a pan adds small-sized onion sliced, ginger and garlic paste and sauté for a few minutes.
- Add tomato and brinjal and cook until the oil separates from the mix
- Add turmeric powder, coriander powder, fish masala powder, cumin powder and chilli powder, jeera powder, dhania powder, salt as required and saute for 2 min
- Add fresh small fish powder and cook for some time.
- Add garam masala, coriander leaves
- Add hot water and cook for 45 min just before turning off the heat, add a few coriander leaves (for better flavour).



Annexure-2: List of participants for the Zonal workshop on fish-based nutrition for human health

Sl no.	Participants Name	Designation	Contact no.
1	Dr. C.V. Mohan	Principal Scientist, WorldFish,	9972724949
2	Dr. B.K. Bhattacharjya	Principal Scientist & Head, ICAR-CIFRI, Guwahati	9435553247
3	Dr. Binod Kalita	(i/c) Dean, College of Fisheries	9864244477
4	Dr. Chayan Kr. Acharjee	Deputy Director of Fishery	9835561378
5	Dr. Pranja Pratim Sharma	Member, Assam Agriculture Commissioner	8638963478
6	Dr. Dandadhar Sarma	Prof. Dept of Zoology, Guwahati University,	9435312768
7	Ratul Sharma,	AFIO, DoF	7578008563
8	Dr. D. J Sharma	Nodal Officer, APART, DoF	9854944700

9	Dr. Sanjay Sarma	Fishery Coordinator, ARIAS	9435309568
10	Dr. Baishnaba Charan Ratha	Senior Nutrition specialist	9438001964
11	Arup Goswami	Sr. Technical Expert	9707020469
12	Dr. Ranjita Bania	Fisheries Biologist	9678891071
13	Ashish Kr. Borah	Officer in Charge, NFDB, Guwahati	8638664691
14	Dipesh Debnath	Sr. Scientist, ICAR-CIFRI, Guwahati	9101428563
15	Samip Kr. Deka	Block Development Officer, Dolongghat	9435092773
16	Dr. S. Vijay Sekhar Rath	Team Leader, Grant Thornton Bharat	8688408480
17	Mr. Putul	Team Leader- ICCOA	8011004958
18	Sandeep Jaishi	DBE-ICCOA	8159867195
19	Sanjay Tamuli	FDO	8486012611
20	Anushree Das	SDFDO, DoF	9678256353
21	Chandana Gurung	Consultant, PWC	7290899198
22	Begum Rehena Parvin	TEF, OPIU	9101695300
23	Pranjal Pratim Gautam	PA-APART	8876012338
24	Rup Kumar Nath	ECF- Goalpara	9365800915
25	Raben Das	FDO- Kamrup	8638844658
26	Dr. Anupam Sharma	DFDO- Goalpara	9957941576
27	Utpal Kalita	FDO	9101147708
28	Abu Suvan	TEF, Morigaon	7002269881
29	M.P. Rownier	Team Leader, APARI, SIMFED	9435134606
30	Biraj Sarma	FDO	7002332287
31	Debnath Medok	FDO, Kamrup	8723893689
32	Sudakshina kalita	ECF, kamrup	8011611694
33	Deepjyoti Mudiar	ECF, OPIU	9760173549
34	Gunajit Talukdar	TEF, Nalbari	6002012964
35	Dipankar Talukdar	TEF, Darrang	7002561962
36	Habiba Jahan Ahmed	TEF, kamrup	9957503956
37	Rituporna Borah	Representative, Kolong FPG	8472086715
38	Mukaddim Hazarika	Representative, Kolong FPG	7002422706
39	Dr.Dharitri Baruah	Technical Expert, WorldFish	7636006100
40	Dipankar Hazarika	Fish Farmer	7002706475
41	Dulumoni Nath	Fish Farmer	6901757372

42	Deepjyoti nath	Fish Farmer	9854232005
43	Ashok Hussain khan	Fish Farmer	8099926367
44	Anil Kr. Deka	Fish Farmer	9365413315
45	Mr. K. Borah	Fish Farmer	6003815907
46	Paritosh Das	Fish Farmer	9954570744
47	Narendra Ch. Mallik	Fish Farmer	9957475466
48	Priyanka Choudhury	ECF, Nalbari	6000956013
49	Bhabita Deka	ECF, Darrang	7002736756
50	Ruhini Kr. Nath	ECF, Morigaon	9854228339
51	Bubul Sainary	TEF, Goalpara	8638299927
52	Mohan Haloi	ECF, Nalbari	8638115183
53	Pradip Ch. Konwar	FPC Member	9959322482
54	Jalal Uddin	FPC Member, Morigaon	7002701974
55	Nabamika Sonowal	TEF, WorldFish	9101062946
56	Neeta Beypi	TEF, WorldFish	7002656406
57	Mr. M. Medhi	Farmer, Kamrup	7002185814
58	Kandarpa Patgiri	Farmer, Goalpara	6000701415
59	Narendra Rabha	Farmer, Goalpara	9678581253
60	Ranjan Kr. Rabha	Farmer, Goalpara	9101290266
61	Ramal Ch. Rabha	Farmer, Goalpara	6003253994
62	Padmatochan Kalita	Farmer, Goalpara	6003898005
63	Durgeshwar Boruah	Farmer, Goalpara	6002007582
64	Debojit Ray	Farmer, Goalpara	6000109744
65	Abu Bakkar	Farmer	7628961427
66	Rajiv Kr. das	Farmer	9365299295
67	Brajen majumdar	FPC Member	8473001287

Annexure-3: List of participants for the state level workshop on fish based nutrition for human health

SI No	Name	Designation	Mobile No
1.	Dr. Shakuntala Thilsted	Global lead, Nutrition expert, WorldFish	6017-7811606
2.	Smt Roshni Aparanji Korati, IAS	State Project Director (SPD), ARIAS	9401083865
3.	Dr. B.K. Bhattacharjya	Principal Scientist & Head, ICAR-CIFRI, Guwahati	9435553274
4.	Mr. Sanjib Choudhary	Joint Director of Fisheries	9435344046
5.	Shehnab Jahia	Deputy commisioner, kamrup	7086011455
6.	Chayaun Acharjee	DDF (FSF)	9435561378
7.	Dr. D. J. Sharmah	NO, OPIU, Fishery	9854944700
8.	Dr. Sanjay Sarma	Fishery Coordinator, ARIAS Society,	9435309568

9.	Dr. Baishnaba C. Ratha	Senior Nutrurion Specialist, WorldFish	8917547315
10.	Dr. Dipesh Debnath	Sr. Scientist, ICAR-CIFRI	9101428563
11.	Dr. Sona Yengkokpam	Sr. Scientist ICAR-CIFRI	8486542818
12.	Dr.SamalChandra Sukladas	Sr. Scientist ICAR-CIFRI	8756056892
13.	Mr. Inam Aktar	AP, COF, Raha	9954253535
14.	Parag Saikia	SMS (Fisheries Sc.) KVK, kamrup	9101787776
15.	Anushree Das	SDFDO, DoF	9678256353
16.	Atanu Chatterjee	EMS, ARIAS Society	9811090396
17.	Biraj B. Sharma	No, APART, Kamrup	2002332287
18.	Dr. Sanjay Sarmah	F.C. ARIAS Society	9435309568
19.	Ratul Sharma	AFIO, DoF, Assam	7578008563
20.	Hemen Deka	FDO, Barpeta	9706693068
21.	Khanindra Bhuyan	DFDO (i/c), Jorhat	8575592287
22.	Manash Pratim Gogoi	FDO, Jorhat	886821135
23.	Julfikar Ali	DNO, Dhubri	9101073360
24.	Rituparna Pegu	FDO,Nagaon	6001915725
25.	Jyotishna Bora	FDO, Golaghat	7086898415
26.	Sashin Sharma	FDO	6000520485
27.	Bhadraswar Mili	FDO, Dhemaji	9706727004
28.	Arupjyoti Patgiri	FDO, FISHFED	9101541776
29.	Dillu Sarma	VC, FISHFED	7002135588
30.	Dr. Sandeep Seth	State Nutrition consultant	9559896949
31.	Debajit Bora	Deputy Director, WCD	6000084878
32.	Kasturi Das	CDPO,ICDS, Ghy	9706530396
33.	Dr. Anupam Sharma	DFDO, Goalpara	9957941576
34.	Kalpajit Kalita	FDO, Bongaigaon	9101541793
35.	Jyotish Talukdar	Director, Kolong-Kopili	9859333320
36.	Jayanta Talukdar	PME, ARIAS	9859538308
37.	Sheetala Chintey	TEF, APART	8133024818
38.	Abdul Malik Ahmed	TEF, APART	6901157037
39.	Monisha Baruah	PC, Kolong-Kopili	8812060723
40.	Dimple S. Das	PICS, ARIAS	9436110568
41.	Aarshad Ali	Fishermen	9101892478
42.	Siddque Ali	Fishermen	9678751410
43.	Sarjish Akhtar	ECF, APART	9864883717
44.	Biswajit Bora	ECF, APART	9101745229
45.	Prakash Kalita	TEF, APART	7002487580
46.	Deepjyoti Mudiar	ECF, APART	9706173541
47.	Arnab Bishya	PA, OPIU	7002158181
48.	Habiba J. Ahmed	TEF, APART	9957503956
49.	Pinky Basumatary	PA, CoF, Raha	8974214850
50.	Kangkana Das	PA, CoF, Raha	8011312537
51.	Homen Saikia	TEF, Dhubri	6001640700
52.	Sandeep Duwara	CDPO	8403944016

53.	Juri Bhattacharjya	CDPO	9706958714
54.	Dorothy M.S.	EA-Tech,NFDB	7738673398
55.	Iftikar Choudhury	Prag News	7002910151
56.	Kunjal Pathak	FPC, Rangia	7010393562
57.	Biswajit Bhuyan	Fishermen	-----
58.	Bhupen Das	Fishermen	9707712384
59.	Dashin Sarma	Fishermen	6000520485
60.	Bijit Bania	VP, COF,Raha	7896291224
61.	Pragyan Bhuyan	G.S, COF, Raha	7002710572
62.	Mr. Abu Suwan	TEF, APART	7002269881
63.	NabamikaSonowal	TEF, WorldFish, APART	9101062946
64.	Dipankar Pathak	TEF, APART	8011139508
65.	Mr. RupanPegu	TEF, APART	7399501151
66.	BubulSainary	TEF, APART	8638299927
67.	Mr.SumanSaikia	TEF, Jorhat, APART	8474846912
68.	Mahmud Ali	ECF, APART	9365231318
69.	Dipankar Talukdar	TEF, APART	7002561962
70.	S.R. Laskar	Prog. Officer, FISHCOPFED	8133826704
71.	Dr. Dharitri Baruah	TechnicalCoordinator, WorldFish	7636006100
72.	Rajibul Islam	ECF, APART	8638644388
73.	Mohan Halo	ECF, APART	8638115185
74.	Mr. KandarpanBoruah	TEF, APART	7002399756
75.	Rup Kumar Nath	ECF, APART	9435001159
76.	Bidyut Bikash Medhi	ECF, APART	9435662720
77.	Mr.ArupGoswami	STEF, APART	9707020469
78.	Bhobita Deka	ECF, APART	7002736756
79.	Priyanka Choudhary	ECF, APART	6000956013
80.	Ruhini Kr. Nath	ECF, APART	9854228339
81.	Monjita Hazarika	ECF, APART	6002384211
82.	Utpal Chakraborty	ECF, APART	8638108858
83.	Karabi Talukdar	MIS	7005109690
84.	Begum Reheena Parvin	TEF, OPIU, DoF	9101695300

Photographs

1. Training, awareness and demonstration program at Kamrup District





2. Training, awareness and demonstration program at Nalbari District



3. Training, Awareness and demonstration program at Golapara district





4. Training, awareness and demonstration program at Berpata district





5. Training, awareness and demonstration program at Sonitpur district



6. Training, awareness and demonstration program at Lakshmipur district



7. Training, awareness and demonstration program at Sivasagar district



8. Training, awareness and demonstration program at Jorhat district



9. Training, awareness and demonstration program at Majuli district



10. Training, awareness and demonstration program at Darang district



11. Training, awareness and demonstration program at Morigaon district







12. Launching and demonstration of ICDS SNP in Kukurmara Anganwadi Centre under the Chaygaon block, Kamrup district



Media Coverage

Press Coverage on Fish Nutrition promotion programme organised in various districts of Assam by State's Fishery Department under APART Assam by Assam Tribune.

#presscoverage #fish #nutrition #programme #fishery #APARTAssam

Fish nutrition promotion programme organised

STAFF REPORTER

GUWAHATI, April 17: State's Fishery department recently organised a series of small fish nutrition promotion, awareness and demonstration programmes in different parts of Assam.

The programmes were organised in Morigaon, Kamrup, Nalbari, Sonitpur, Lakhimpur, Sivasagar, Jorhat, Majuli and Darrang under World Bank aided Assam Agri-Business and Rural Transformation Project (APART) through WorldFish, a research-based organisation.

A total of 751 participants attended these programmes, including pregnant women, lactating mothers, adolescent girls, children of different ages, Anganwadi workers and Sahayikas (helpers),



ASHA, GP representatives, APART and other fisheries staff, community leaders, etc.

NK Debnath, Director of Fisheries, said WorldFish extended technical support to create awareness among community people about locally available small fishes and their nutritional values that

can hugely benefit the health of women, adolescent girls and children. He added that "fish is one of the cheapest sources of animal protein, which is available in the community level water body in the State".

Acting as a resource person, Dr Baishnaba C Ratha,

Senior Nutrition Specialist, WorldFish, said the small fish also improves nutrition for pregnant and lactating mothers and young children during the critical first 1,000 days of child development. "A woman must take appropriate nutrition throughout pregnancy to maintain her pregnancy and ensure that her child develops properly, which can be compensated by small fish," he explained.

The hygienic handling of small fish was also discussed by Dr DJ Sharma, Nodal Officer, APART (Fisheries) during the programmes. He explained ways to improve household nutrition, particularly for women and children, by adding micronutrient-rich small fish. "The large fish can be sold for income, while small fish are harvested reg-

ularly for household consumption or, when in excess, for sale within the community or near the market," he added.

Fishery Coordinator (ARIAS) Dr Sanjay Sarma informed that fish powder prepared with locally available mola fish, and recipes like fish powder soup and mixed vegetable small fish powder curry can be very tasty and nutritional.

Different social behaviours change communication materials prepared in the local language on the benefits of small fish nutrition were distributed among all the participants for their better understanding.

Nabamika Sonowal and Nita Beippi, fisheries consultants under WorldFish, attended these programmes as resource persons and extended technical know-how to the participants.

'Matsya Paripusti' project launched in Kamrup

STAFF REPORTER

GUWAHATI, Sept 10: With the Rashtriya Poshan Maah being celebrated across the country, the Kamrup district administration has taken up a pilot project named 'Matsya Paripusti' in the Chaygaon block.

The pilot project, being sponsored by the IOCL and supported by the fishery department and the ARIAS Society, aims to augment the nutrition profile of malnourished children by adding dried small fish powder in their diets. More than 200 Anganwadi centres from the Chaygaon

block have been selected for the purpose to reach out to 7,000 children in the age group of 3 to 6 years.

It is worth mentioning that in addition to high-quality protein, vitamins and minerals, fish is a great source of healthy fats, such as DHA, which are essential for a child's brain development, nervous system and vision.

The programme was launched at No.2 Kukurmara Anganwadi Centre under the Chaygaon Development Block on Thursday in the presence of Deputy Commissioner Keerthi Jalli, District Social

Welfare Officer Shehnab Sahin, and officials from the partner organizations.

Addressing the gathering, the Deputy Commissioner urged all concerned to cooperate with this noble initiative launched by the district administration.

"Malnutrition, especially in the growing age, can lead to a number of health risks for a child. It must be checked by offering adequate nutrition," Jalli said.

She also said that the administration would try to extend it to other areas of the district in the coming days.

Awareness prog on beel fisheries, nutrition

CORRESPONDENT

NAGAON, Aug 17: The district fisheries department organised a series of awareness-cum-demonstration programmes on development of beel fisheries and promotion of small fish nutrition at Dighali Beel, Buka Beel and Mikirdhar Beel recently.

The programmes were initiated under the World Bank-aided Assam Agribusiness and Rural Transformation Project (APART) through 'WorldFish', a research-based international organisation.

Over 300 participants, including pregnant women and lactating mothers, adolescent girls, children of different ages,

Anganwadi workers, school teachers, APART and other fisheries staff, fish farmers and community leaders participated in the programmes.

During the awareness drive, Sushil Nath, district fisheries officer of Nagaon, and Dr Sanjay Sarma, fishery coordinator of APART, explained the sources of fish, particularly small fish, at the community level and their consumption habits, including different popular fish recipes prepared by local communities as a natural resource of beel fisheries.

Rituparna Pegu, district nodal officer of APART in Nagaon district, coordinated these programmes. Dr Benoy Barman, senior scientist and Dr

Baishnaba Chandra Ratha, senior nutrition specialist, WorldFish elaborated on the strategies for scientific beel fisheries development and small fish production, which is supposedly the cheapest source of animal protein and other important micronutrients such as vitamin A, vitamin B12, iron, calcium, zinc and essential fatty acids.

During the programme, Prakash Kalita and Bidyut Medhi, APART consultants, motivated the fish farmers that large fish can be sold for income, while small fish may be harvested regularly for household consumption or, when in excess, for sale within the community or near the market, the release mentioned.

Fishery Dept organises workshop on small fish nutrition



GUWAHATI, Sept 23: A State-level workshop on fish nutrition and human health focusing on increasing consumption of nutritious small fish to combat malnutrition in Assam was organised at the Indian Institute of Bank Management conference hall, here in the city by the Department of Fisheries under the World Bank-funded Project APART. More than 100 participants from various government departments, College of Fisheries, FISHEED, ICDS officials, FPC representatives, NFD, CIFRI, UNICEF, ICDS and NIPCCD and several NGOs attended the programme. This was stated in a press release.

Dr Shakuntala Haraksingh Thilsted, recipient of the prestigious World Food Prize and Global Lead for Nutrition and Public Health at WorldFish, Malaysia, attended the programme. She also proposed the Government of Assam to consider including small fish-based products at the policy level, how different value-added small fish-based products will be an integral part of a diversified diet, particularly for women, adolescents and children in the State, focusing on REDMI 10 5G PRO CAMERA

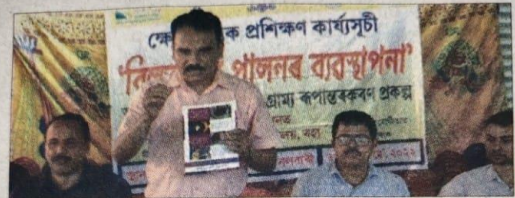
the efforts taken by the Department of Fisheries, APART and WorldFish to promote fish-based nutrition at the community level through awareness and demonstration programmes in different parts of the State and recent developments to start pilot programme.

Dr Dhirubajyoti Sharma, Nodal Officer, APART (Fishery) anchored the programme while Sanjib Choudhury, Deputy Director of Fisheries, offered the welcome address. The written message of the State Minister of Fisheries was read out in the programme. In his speech, the minister appreciated the fact that the ARIAS Society and Fisheries Department are adopting this innovative approach to tackle the problem of undernutrition in the State by making use of the locally available vast fisheries resources, through the so that both the beneficiaries of ICDS, women and children and the farmers, will be benefited. He assured all support from the Government of Assam to scale up this type of innovative programme in other parts of Assam in a phased manner. The chief guest, Roshni Aparajit Korati, State Project

Director of ARIAS Society, expressed her view that fish and aquatic food systems are an integral part of food production, local diets, culture, child and maternal health, and general wellbeing in the State of Assam. So they must occupy a central role in future nutrition-focused interventions, policy and investment decisions for agricultural research and development that consider the need for a holistic and sustainable transformation of all food systems in land and water. She also released a recipe booklet on different small fish recipes in rural Assam prepared by WorldFish along with the Department of Fisheries.

Dr BK Bhattacharya, principle scientist, CIFRI, Dr Dipesh Debnath, senior scientist of ICAR-CIFRI, Dr Baishnaba Chandra Ratha, senior nutrition specialist, WorldFish, Dr Sanjay Sarma, fishery coordinator of ARIAS Society, Dr Inam Akhtar, assistant professor, College of Fisheries and Dr DJ Sharma, MD, FISHEED explained the benefits of small fish consumption for better nutrition and health. Chayan Acharjee, Deputy Director of Fisheries, offered the vote of thanks.

বিলত মাছ পালনৰ প্ৰশিক্ষণ 'এপাৰ্ট'ৰ



অনুষ্ঠানত 'এপাৰ্ট'ৰ বিষয়াসকল

'আমাৰ অসম'ৰ বহাৰ প্ৰতিবেদক, ১৪ মে' ৪ বিশ্ববেংকৰ অৰ্থ সাহায্যত কৰ্মায়িত 'অসম কৃষি বানিজ্য আৰু গ্ৰাম্য কৃপাস্বকৰণ প্ৰকল্প' (এপাৰ্ট)ৰ অধীনত বহা মীন মহাবিদ্যালয়ৰ জৰিয়তে বাজ্যখনৰ বিভিন্ন জিলাৰ প্ৰায় কুৰিখন সমূহীয় বিলৰ সদস্যক প্ৰশিক্ষণৰ ব্যৱস্থা কৰা হয়। বহা মীন মহাবিদ্যালয়ৰ বিজ্ঞান গুৰু ডঃ বিনোদ কলিতাৰ নেতৃত্বত 'এপাৰ্ট'ৰ প্ৰকল্প বিষয়াৰ জৰিয়তে শিৱসাগৰ, নগাঁও, মৰিগাঁও, নলবাৰী জিলাত এই প্ৰকল্পৰ জৰিয়তে জলবায়ু সহিষ্ণু প্ৰযুক্তিৰে বিলত বহনক্ষম মৎস্য উৎপাদনৰ ব্যৱস্থাৰ বিভিন্ন দিশৰ আলোচনা কৰা হয়। সমূহীয়া বিলৰ দাঁতি কাষৰীয় লোকসকলক লৈ একোখনকৈ বিল উন্নয়ন সমিতিও গঠন কৰা হয়। বিল উন্নয়ন সমিতি সমূহক উজ্জীৱিত কৰি মাছৰ পোনা প্ৰতিপালনৰ পৰা উচ্চ উৎপাদনক্ষম মাছৰ প্ৰজাতি পালন আৰু সৰু মাছ যেনে মোৰা, পুঠি আদিৰ বংশ বৃদ্ধি কৰাকে ধৰি ভালেমান সৰলীকৃত প্ৰযুক্তি কৌশলৰ বিষয়ে আলোকপাত কৰা হয়। বিশ্ববেংকৰ এই প্ৰকল্পৰ জৰিয়তে মাছৰ বহনক্ষম উৎপাদকতা প্ৰতি হেস্তৰত বহুৰি প্ৰায় ২ টনলৈ বৃদ্ধি কৰাৰ পোষকতা কৰা কৰিছে। অনুষ্ঠানত মীন বিষয়া ডঃ সঞ্জয় শৰ্মা, ডঃ প্ৰনবজ্যোতি শৰ্মাসহ প্ৰশিক্ষণত জিলা মীন বিষয়াৰ লগতে সংশ্লিষ্ট মীন বিষয়া, মীন প্ৰদৰ্শক, মীন কাৰিকৰী বিষয়াকে আদি কৰি 'এপাৰ্ট'ৰ প্ৰকল্প সহযোগী সকলেও অংশগ্ৰহণ কৰে।

এপাৰ্টৰ অধীনত মীন মহাবিদ্যালয়ৰ জৰিয়তে বিলত মাছ পালন

দৈনন্দিন বাৰ্তাৰ সেৱা, বহা, ১২ মে' ৪ বিশ্ববেংকৰ অৰ্থসাহায্যত ৰূপায়িত 'অসম কৃষি বাণিজ্য আৰু গ্ৰাম্য ৰূপান্তৰকৰণ প্ৰকল্প' (এপাৰ্ট)ৰ অধীনত বহা মীন মহাবিদ্যালয়ৰ জৰিয়তে ৰাজ্যখনৰ বিভিন্ন জিলাৰ প্ৰায় কুৰিখন সমূহীয় বিলৰ সদস্যসকলক প্ৰশিক্ষণৰ ব্যৱস্থা কৰা হয়। বহা মীন মহাবিদ্যালয়ৰ বিজ্ঞান গুৰু ডঃ বিনোদ

কৰাকে ধৰি ভালেমান সবলীকৃত প্ৰযুক্তি-কৌশলৰ বিষয়ে আলোকপাত কৰা হয়। উল্লেখযোগ্য যে ৰাজ্যখনত হিল উন্নয়নৰ যথেষ্ট সম্ভাৱনীয়তা আছে যদিও ইয়াৰ উৎপাদকতা যথেষ্ট কম। বিশ্ববেংকৰ এই প্ৰকল্পৰ জৰিয়তে মাছৰ বহনক্ষম উৎপাদকতা প্ৰতি হেক্টৰত বছৰি প্ৰায় ২ টনলৈ বৃদ্ধি কৰাৰ পোষকতা কৰা হৈছে। এই প্ৰশিক্ষণত



কলিতাৰ নেতৃত্বত 'এপাৰ্ট'ৰ প্ৰকল্প বিষয়াৰ জৰিয়তে শিৱসাগৰ, নগাঁও, মৰিগাঁও, নলবাৰী জিলাত এই প্ৰকল্পৰ জৰিয়তে জলবায়ু সহিষ্ণু প্ৰযুক্তিৰে বিলত বহনক্ষম মৎস্য উৎপাদনৰ ব্যৱস্থাৰ বিভিন্ন দিশৰ আলোচনা কৰা হয়। সমূহীয়া বিলৰ দাঁতি-কাষৰীয় লোকসকলক লৈ একোখনকৈ বিল উন্নয়ন সমিতিও গঠন কৰা হয়। বিল উন্নয়ন সমিতি, চমুকৈ উজ্জীৱিত কৰি মাছৰ পোনা প্ৰতিপালনৰ পৰা উচ্চ উৎপাদনক্ষম মাছৰ প্ৰজাতি পালন আৰু সৰু মাছ যেনে- মোৰা, পুঠি আদিৰ আবাদী বৃদ্ধি

জিলা মীন বিষয়াৰ লগতে সংশ্লিষ্ট মীন বিষয়া, মীন প্ৰদৰ্শক, মীন কাৰিকৰী বিষয়াকে আদি কৰি 'এপাৰ্ট'ৰ প্ৰকল্প সহযোগী সকলেও অংশগ্ৰহণ কৰে। বিশেষকৈ এপাৰ্টৰ ৰাজ্যিক নডেল বিষয়া ডঃ প্ৰজ্যোতি শৰ্মা আৰু ৰাজ্যিক মীন সমন্বয়ক ডঃ সঞ্জয় শৰ্মায়ো কেইবাটাও এনে প্ৰশিক্ষণত অংশগ্ৰহণ কৰে। মীন মহাবিদ্যালয়ত পৰৱৰ্তী পৰ্যায়ত ক্ৰমে গোৱালপাৰা, ধুবুৰী আৰু শোণিতপুৰ জিলাৰ মীনপালকক লৈ অনুৰূপ প্ৰশিক্ষণৰ আয়োজন কৰাৰ পৰিকল্পনা কৰা হৈছে বুলিও জানিবলৈ দিছে।



Awareness programmes on beel fisheries and fish nutrition held

A CORRESPONDENT

NAGAON, Aug 12: Nagaon District Fisheries Department organized a series of awareness and demonstration programmes on beel fisheries development and small fish nutrition promotion at Dighali Beel, Buka Beel and Mikirdhar Beel from Thursday. The programmes were initiated under World Bank aided Assam Agribusiness and Rural Transformation Project (APART) through 'World Fish', a research-based international CGIAR organization.

Over 300 participants including preg-

nant women and lactating mothers, adolescent girls, children of different ages, Anganwadi workers, school teachers, APART and other fisheries staff, fish farmers and community leaders participated in the programmes. During the awareness drive, Sushil Nath, district fisheries officer, Nagaon, and Dr Sanjay Sarma, Fishery Coordinator of APART, explained about the sources of fish, particularly small, in community level and their consumption habits, including different popular fish recipes prepared by local community at the natural resource of beel

fisheries.

Rituparna Pegu, district nodal officer of APART in Nagaon district, co-ordinated these programmes. He also spoke on the importance of such a programme at the cluster level of different development blocks of the district saying that it had a bigger impact to include small fish as a super food in the diversified diet of community people, particularly women and children.

Dr Benoy Barman, senior scientist, and Dr Baishnaba Ch. Ratha, senior nutrition specialist, World Fish, elaborated the strategies for scientific beel fisheries

development and small fish production. Dr Ratha demonstrated to ICDS Anganwadi workers and community members, particularly mothers and caretaker of children, the preparation process of small fish powder hygienically at household level with locally available small fish.

During the programme, Prakash Kalit and Bidyut Medhi, APART consultants to fish farmers that large fish can be sold for income, while small fish are harvested regularly for household consumption or, when in excess, for sale within the community or near the market.

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মৰিগাঁও জিলা মীন বিভাগৰ সৌজন্যত সজাগতা সভা

এপাৰ্টৰ অধীনত মাছৰ পৰিপুষ্টি সম্পৰ্কে আলোচনা

দৈনন্দিন বাৰ্তাৰ সেৱা, বহা, ১০ জুলাই ৪ মৰিগাঁও জিলা মীন বিভাগৰ সৌজন্যত বিশ্ববেংকৰ 'এপাৰ্টৰ' জৰিয়তে মানুহৰ দেহৰ বাবে মাছৰ পৰিপুষ্টি সন্দৰ্ভত কালি মৰিগাঁও জিলাৰ জালুগুটিৰ সাত গাঁও প্ৰাথমিক বিদ্যালয় আৰু চাবুকধৰাৰ চাৰিপুনীয়া প্ৰাথমিক বিদ্যালয়ত দুখন মীন সজাগতা সভা অনুষ্ঠিত হয়। দুয়োখন সভাতেই মৰিগাঁও জিলা মীন উন্নয়ন বিষয়া ভাস্কৰজ্যোতি নাথ, এপাৰ্টৰ জিলা নডেল বিষয়া আনোৱাৰ হুছেইন খান বিশিষ্ট অতিথি হিচাপে উপস্থিত থাকে। সভাত 'WORLD FISH' নামৰ আন্তঃৰাষ্ট্ৰীয় প্ৰতিষ্ঠানৰ পৰিপুষ্টি বিষয়ক জ্যেষ্ঠ বিশেষজ্ঞ ড° বৈষ্ণৱ চাৰণ ৰাথাই সমল ব্যক্তি হিচাপে উপস্থিত থাকি সৰু মাছৰ পৰিপুষ্টি আৰু মহিলা তথা শিশুৰ বাবে মাছৰ উপকাৰিতা সন্দৰ্ভত বিশদ ব্যাখ্যা আগবঢ়ায়। এপাৰ্টৰ মীন কাৰিকৰী বিশেষজ্ঞ নৰমিকা সোণোৱাল আৰু নীতা বেইপীয়ে সৰু মাছৰ পৰিপুষ্টি আৰু ইয়াৰ বিভিন্ন ব্যঞ্জন আদিৰ বিষয়ে উপস্থিত ৰাইজক বিৱৰি কয়। দুয়োখন মীন সজাগতা সভাতেই মীন কাৰিকৰী সমন্বয়ক ড° ধৰিত্ৰী বৰুৱা, মৰিগাঁও এপাৰ্টৰ



পৰামৰ্শদাতা ৰোহিণী কুমাৰ নাথ উপস্থিত থাকে। সাতগাঁৱৰ সভাখনত আশাকৰ্মী, অংগনৱাদী কৰ্মী, বিভিন্ন আত্মসহায়ক গোটৰ সভানেত্ৰী আৰু সম্পাদিকা, চাৰিপুনীয়া প্ৰাথমিক বিদ্যালয়ৰ সভাখনত চাৰিপুনীয়া বিল উন্নয়ন সমিতিৰ সদস্য-সদস্যসকলে অংশগ্ৰহণ কৰে। উল্লেখ্য যে এই এপাৰ্টৰ জৰিয়তে ৰাজ্যখনৰ পঞ্চাশখন এনে সজাগতা শিবিৰৰ আয়োজন কৰা হয়। লগতে শিবিৰৰ সভাসমূহত সৰু মাছৰ উপকাৰিতা সন্দৰ্ভত বিনামূলীয়া পুস্তিকাও বিতৰণ কৰা হয়।

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.

For more information, please visit www.worldfishcenter.org