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Enhanced Coastal Fisheries in Bangladesh Project (ECOFISH): Completion Report



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Produced by

ECOFISH-Jointly implemented by WorldFish Bangladesh and Department of Fisheries Bangladesh

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Table of contents

List of abbreviations	iii
Executive summary	1
The coastal ecosystem in Bangladesh and ECOFISH activities	4
Theater of operation	7
Theory of change	8
Approach and principles	9
Project management	10
Key results and accomplishments	12
Improved fisheries science for decision-making	12
Strengthened fisheries adaptive co-management	16
Enhanced resilience of hilsa fishing communities	24
Improved policy, power and incentives	29
Interventions in zone of resilience	35
Crosscutting dimensions	36
i. Communication and sharing knowledge	36
ii. Gender integration in fisheries management	40
iii. Social and technical innovations	40
iv. Environment and climate change	40
v. Capacity building	41
Project performance: monitoring, evaluation and learning	43
Impacts, sustainability and lessons learned	46
Contribution to Sustainable Development Goals and Aichi Biodiversity Targets	51
Conclusion	52
Notes	53
Annex 1. ECOFISH's theory of change (TOC), Version 5	54
Annex 2. ECOFISH publications	55
Annex 3. ECOFISH outputs	58
Annex 4. ECOFISH training materials	59
Annex 5. ECOFISH workshops	60

List of abbreviations

AIGA	alternative income generating activity
BCC	behavior change communication
BFDC	Bangladesh Fisheries Development Corporation
BFRI	Bangladesh Fisheries Research Institute
BLS	business literacy school
CFG	community fish guard
CGIAR	Consultative Group on International Agricultural Research
CNRS	Center for Natural Resource Studies
COAST Trust	Coastal Association for Social Transformation
CODEC	Community Development Centre
CREL	Climate Resilient Ecosystem and Livelihoods
CSG	community savings group
DCC	district co-management committee
DFO	district fisheries officer
DOF	Department of Fisheries
EAFM	Ecosystem Approach to Fisheries Management
ECOFISH	Enhanced Coastal Fisheries in Bangladesh
EMMP	Environmental Monitoring and Mitigation Plan
FMC	fisheries management committee
FWC	Fishers' Women Congress
GOB	Government of Bangladesh
GSI	gonadosomatic index
HCDF	Hilsa Conservation and Development Fund
HCG	Hilsa Conservation Group
HDDS	Household Dietary Diversity Score
HFIAS	Household Food Insecurity Access Scale
HFMAP	Hilsa Fisheries Management Action Plan
HGG	hilsa ghat group
iDE	International Development Enterprises
IIED	International Institute for Environment and Development
IOM	International Organization for Migration
IRs	intermediate results
IUCN	International Union for Conservation of Nature
LEK	local ecological knowledge
M&E	monitoring and evaluation

MEL	monitoring, evaluation and learning
MOFL	Ministry of Fisheries & Livestock
MPA	marine protected area
MSY	maximum sustainable yield
NGO	nongovernmental organization
NRM	natural resource management
PES	payment of environmental services
PPRC	Power and Participation Research Centre
PSA	public service announcement
PSC	project steering committee
PTC	project technical committee
SCMFP	Sustainable Coastal and Marine Fisheries Project
SDG	Sustainable Development Goal
SSF	small-scale fisheries
TAPP	Technical Assistance Project Proforma
TOC	theory of change
TOO	theater of operations
UCC	upazila co-management committee
URI/CRC	University of Rhode Island, Coastal Resources Center
USAID	United States Agency for International Development
USG	United States Government
WCS	Wildlife Conservation Society
ZOR	Zone of Resilience

Executive summary

Enhanced Coastal Fisheries in Bangladesh (ECOFISH) was a 5-year initiative that ended on December 31, 2019. Funded by the United States Agency for International Development (USAID), the project was jointly implemented by WorldFish and Bangladesh's Department of Fisheries (DOF). ECOFISH supported coastal fishing communities and other stakeholders along the fisheries value chain to improve the resilience of the Meghna River ecosystem and communities reliant on coastal fisheries. The project's primary pathway was establishing adaptive co-management in hilsa shad (*Tenualosa ilisha*) sanctuaries. This was supported by advancement in fisheries science, promoting alternative income generating activities (AIGAs) and developing policies related to incentives for fisheries conservation. Through its project activities, ECOFISH contributed to USAID's Country Development Cooperation Strategy Objective 4 (DO4): "Responsiveness to Climate Change Improved." It did so by aligning with two sub-intermediate results (IRs) of DO4:

1. improved management of natural resources focused on biodiversity conservation leading to indirect adaptation benefits.
2. enhanced adaptation capacity and resilience to shocks.

This report summarizes the results, accomplishments, impacts and lessons learned throughout the duration of the project, from 2014 to 2019.

ECOFISH's first component was the science (IR1). This aimed at building a comprehensive picture of the hilsa fishery and assisted policymakers in formulating best management practices. Generating high quality and reliable fisheries science supported the fishery managers and stakeholders in planning how to manage the hilsa fishery. The project estimated the maximum sustainable yield (MSY) of hilsa was about 526,000 metric tons per year in 2016 and 690,000 metric tons per year in 2019 at the level of first capture (25 cm TL). This revealed a huge increase in the size of hilsa throughout Bangladeshi waters. The exploitation level of fish has increased and was gradually moving toward optimum levels. The fishery could improve even further after the implementation of ECOFISH's recommended allowable mesh size of 6.5 cm for hilsa gillnet, which the government has already accepted. The project also recommended an effective 22-day brood hilsa ban, which the government has been implementing. This most appropriate method to maintain a balance between conservation and maintaining the livelihood of fishers.

Using DNA analysis, ECOFISH was even able to resolve a long-time dispute by confirming the presence of three hilsa sub-species or ecotypes in Bangladesh waters and spawning in the natal rivers. The project also helped formulate a new spatial-based management policy for the hilsa fishery. To help policymakers, ECOFISH assessed water quality parameters and the pollution level of the major rivers. In addition, the project observed 200 fish species under 45 families and 13 shrimp species belonging to two families in the Meghna River Basin. ECOFISH assessed the biodiversity status of megafauna (dolphins, sharks and turtles) and endangered wader birds, and it engaged 60 citizen scientists (trained boat skippers) to monitor catches and conserve megafauna. The project developed value-added boneless hilsa products (both soup and noodles) for a wide range of consumers, and the production technology has already been officially handed over by the honorable minister of the Ministry of Fisheries and Livestock (MOFL) to a private entrepreneur, Virgo Fish and Agro Process Ltd. for its commercial production and marketing.

The second component was adaptive co-management (IR2). This aimed at synergies between top-down and bottom-up approaches for resource management involving all stakeholders, including the Government of Bangladesh (GOB). The project also introduced the Ecosystem Approach to Fisheries Management (EAFM) involving fisheries stakeholders in which co-management activities were implemented in 136 fishing villages and 63 fish landing centers. These were strategically selected from 92 unions and 36 upazilas in 12 coastal districts covering all 6 hilsa sanctuaries. The project established 575 hilsa conservation groups (HCGs), 148 women-led community savings groups (CSGs), 133 village-level fisheries management

committees (FMCs) and 63-hilsa ghat groups (HGGs). The [building blocks of the co-management committees](#), at different tiers, contributed to forming participatory adaptive co-management committees in the six-hilsa sanctuaries of the Padma-Meghna river systems. This was accomplished through the formation of 67 [co-management committees](#) in different administrative tiers, including 6 districts, 13 upazilas, 36 unions and 12 ghats. The project recruited, trained and engaged 400 [community fish guards](#) (CFGs) to work with the DOF, the coast guard and river police to achieve 100% [compliance](#) of government rules and regulations in the areas where the project intervened along the six hilsa sanctuaries.

Through ECOFISH's HCG graduation model, five key topics were used to bring about a change in behavior across the communities where the project worked:

1. discussions and training sessions on biodiversity conservation
2. a management action plan for the hilsa fishery
3. the necessity of fishing bans at different times of the year
4. livelihood aspects of fishing households
5. socio-ecological challenges.

Using this approach, the project was able to educate 20,800 grassroots fishers (30% of whom were women) on sustainable natural resource management (NRM) and biodiversity conservation. Gender mainstreaming was a key area of the project in which it carried out interventions to empower women in their communities and help them contribute to fisheries management. Among other events, ECOFISH organized the [Fishers Women Congress \(FWC\)](#) every year to raise the voice of women on biodiversity conservation and maintain social well-being in their communities.

The third component was livelihood resilience (IR3). This was designed to improve the livelihoods of coastal fishing households by providing training and inputs for diversified and more resilient AIGAs. As part of this effort, the project transferred productive assets and technologies to 19,800 hilsa fishing households. These households are now fully engaged in sound and sustainable AIGAs, both on-farm and non-farm, which provides them with [supplemental income](#) and nutrition to improve their livelihoods. ECOFISH provided technical training to improve the knowledge and skills of about 12,597 HCG members (59% of whom were women) on various microenterprises. ECOFISH introduced CSGs for women fishers to empower them and increase their [participation in hilsa conservation](#). To that end, the project formed 148 CSGs involving 4125 women. BDT 13,373,705 (USD 159,000) was saved, and efforts will continue to strengthen their capital. From this fund, the CSGs have already disbursed soft loans to 3950 women in different fishing communities, which the women have reinvested into different microentrepreneurships. Business literacy schools (BLSs) were also introduced to provide basic literacy, business and loan management skills to 3700 CSG members. Members were given 24 lessons over 6 months to involve them in local businesses and trades.

The fourth component (IR4) focused on improving policies, streamlining power and supporting sustainable incentive mechanisms for coastal fisheries management. After a systematic consultation with the stakeholders and experts, ECOFISH revised the Hilsa Fisheries Management Action Plan (HFMAP). The project conducted a rigorous study over 3 years, and this resulted in the GOB officially declaring [the Nijhum Dwip Marine Reserve a marine protected area \(MPA\)](#). This was done in collaboration with the International Union for Conservation of Nature (IUCN) and the Wildlife Conservation Society (WCS). ECOFISH created the Hilsa Conservation and Development Fund (HCDF) with seed money of BDT 35 million deposited into a DOF-managed bank account to support the fishing communities. Upon request from the DOF, ECOFISH established two model resilient fishing villages, which will be scaled up to 100 fishing villages under the ongoing World Bank-funded Sustainable Coastal and Marine Fisheries (SCMF) project. The SCMF provided scientific evidence and supported the government census for establishing a new sixth sanctuary in the Hizla-Mehendigaj region of Barishal. ECOFISH conducted a [study](#) and identified the [nonconsumable value](#) (non-use value) of hilsa. It also evaluated the impact of the GOB's [compensation scheme](#) in coastal fisheries communities. With the help of the International Institute for Environment and Development's Darwin Initiative project, a transboundary hilsa fishery [knowledge-sharing workshop](#) was organized in Dhaka to share with Myanmar the knowledge and [lessons learned](#) from ECOFISH's best practices.

The most visible success of ECOFISH's science-based adaptive co-management was the bumper production of hilsa over the last 4 consecutive years of the project (2016–2019). The synergistic impacts of management initiatives increased the annual hilsa catch from 5% to 14% (as high as 30% in inland waters) during the first 2 years of the intervention. The average weight of hilsa improved remarkably (from 510 to 915 g) as did weight and production of river catfish. As a result, the income of fisher households increased 65%, which led to improved livelihood resilience and a 15% reduction in poverty.

Most of the information generated through ECOFISH has been used to update the HFMAP to provide management guidelines for the next 10 years. Other long-term benefits for Bangladesh would come from information about optimizing the 22-day brood hilsa ban, the allowable mesh size for hilsa gillnets, data on the MSY for hilsa, delineation of the Nijhum Dwip MPA, and adaptive co-management. Institutionalizing co-management committees or integrating them into the DOF could sustain the project by focusing on some of its important components, such as CSGs, CFGs, FMCs, union Comanagement Committees (CCs), upazila CCs and district CCs. Finally, the livelihood support and management initiatives of the newly declared Nijhum Dwip MPA could continue for its sustainability and future management.

In 2019, the final year of the project, ECOFISH extended interventions to the Zone of Resilience (ZOR) in Cox's Bazar. There it focused on the Ukhiya-Teknaf peninsula in response to the impacts of the recent influx of Rohingya refugees from Myanmar on local communities and natural resources. The project provided livelihood support to meet the immediate needs of 1049 households in 30 fishing villages along the Naf River. This came in the form of vegetable gardening and poultry and livestock rearing to improve income and nutrition of households and to support small businesses. As alternative livelihood options and to earn quick profits, it promoted seaweed and green mussel farming as well as crab fattening and the production of safe and high quality dried fish. These interventions brought about a change in the affected host fishing communities of Teknaf.

Over the 5 years of the project, ECOFISH implemented science-based adaptive co-management in the river sanctuaries of the large river systems of Bangladesh. It is possible that the resulting impacts could continue to expand and provide benefits in the form of increased hilsa and catfish production and biodiversity conservation. To accomplish this, however, well-planned public support is necessary to continuously improve the socioecological conditions of the fishing communities and ensure their resilience.



Fishermen are keeping fish in big bag for carrying.

The coastal ecosystem in Bangladesh and ECOFISH activities

In Bangladesh, fisheries activities are important for poverty alleviation, food security and employment generation. Fish products are the second-largest export commodity and help improve socioeconomic conditions in the country. The most popular fish in Bangladesh, which is also the country's national fish, is hilsa (*Tenualosa ilisha*), a species of shad that spends part of its life in the marine ecosystem and part in the

freshwater riverine system (anadromous). Once abundant in over a hundred rivers throughout the country, hilsa was a cheap and affordable fish for the poor. During the late 20th and early 21st centuries, however, the productivity of the hilsa fishery declined sharply because of overfishing, pollution, harvesting broodstock and juveniles, and constructing barrages in the upstream rivers, which alter river flows and migration routes.



Hauling in hilsa, Bangladesh.

In 2005, the Hilsa Fisheries Management Action Plan was adopted to sustain the hilsa fishery. Since then, a number of donor-assisted projects have strengthened the capacity of the GOB to protect and improve coastal fisheries. ECOFISH was the latest conservation and development initiative for hilsa in Bangladeshi waters. The United States Agency for International Development (USAID) funded the project for joint implementation by WorldFish and the DOF from 2014 to 2019. The project supported coastal fishing communities and other key stakeholders for improving the resilience of the Meghna River ecosystem and communities reliant on coastal fisheries.

ECOFISH supported the DOF and local communities to establish collaborative management—“co-management”—in hilsa sanctuaries. The project also strengthened community resilience by increasing savings and supporting livelihoods that enhanced positive coping mechanisms among marginalized and poor fishers, particularly women. This reduced their risks from climate-affected shocks and stresses as well as fishing bans. The activities focused on using existing local ecological knowledge (LEK) and generating of new scientific knowledge to enhance ecosystem-based management. The project rigorously worked on generating science-based information with stakeholder engagement following the research-into-use approach. Expected outputs were not only for research findings and for evidence products, but were also used in building the capacity of key national partners, including government and nongovernment institutions, and in nationwide communications and networking activities.

Although ECOFISH focused primarily on the hilsa fishery as the country’s flagship fish, it also emphasized other species from the Meghna River, as well as the estuarine and related marine region, which are vital for reinstating ecosystems and livelihoods that depend on it. Not only is hilsa an important source of nutrition for the vast majority of people in Bangladesh, but it also contributes significantly to the national economy, including employment and exports. More than 12% of Bangladesh’s total fish production and over 1% of the country’s gross domestic product comes from hilsa. More than 500,000 fishers living along the Ganges and Meghna Rivers, and coastal areas

directly depend on hilsa to make a living, while another 2.5 million depend directly or indirectly on the hilsa value chain for their livelihood. Hilsa is also culturally, socially and religiously significant to Bengalis in both Bangladesh and India.

To ensure the sustainable yield of hilsa, it is necessary to breed the fish safely and without any obstacles. It is also important to conserve juvenile hilsa, known as *jatka*, for safe large-scale recruitment. To protect both *jatka* and adult hilsa, the GOB framed rules and regulations to conserve and protect the nursery grounds of *jatka* and the peak breeding season for adult hilsa. The project aimed at building awareness on the importance of renewable natural resources and ensuring the participation of all stakeholders, including local public representatives. The DOF, local administration, the coast guard, the navy, fishers and the many people living around the hilsa’s rich river system provided support for uninterrupted breeding of brood hilsa and the nursing of *jatka* to make sure they return to the marine environment. As an incentive, fishers were provided with food grains to live on and inputs to start AIGAs during the ban periods. The government also implemented fisheries conservation measures, including eliminating and destroying illegal gear.

ECOFISH was responsible for taking the initiatives of the government and development partners and moving them forward. The aim was to create sustainable management of coastal fisheries, focusing on hilsa. This was done in a comprehensive manner involving all stakeholders to design and implement adaptive co-management in all hilsa sanctuaries to sustainably manage this important natural resource. Although the conditions of a large-scale open water hilsa fishery were complex and challenging, ECOFISH provided a unique and original demonstration of a decentralized resource management decision-making system. The project expanded this co-management approach into designated hilsa fish sanctuaries to improve the efficiency and effectiveness of existing and future GOB fisheries enforcement and social compensation schemes.

Building resilient socioecological systems was also a priority of the project. The purpose was to enhance the adaptive capacity and social capital of vulnerable fishing communities, for both women

and men, particularly in the area of resource management. The project activities deliberately targeted women in fishing households to alter behavior and empower them to bring about a positive change in the gender dimension of fishing communities. ECOFISH generated science-based information to influence policy decisions of the government, and the project strengthened the capacity and responsiveness of state agencies to support compliance of the rules and regulations stated in the HFMAP. This information was also used to support the well-being of the fishing communities to reduce their suffering.

ECOFISH activities used existing knowledge while generating new local and scientific information. Both were used to diagnose the status of the socioecological system and define needs and opportunities to enhance fisheries and marine ecosystem management. Two methods were used to accomplish this: (1) reduced overfishing and (2) improved community empowerment in fisheries management and livelihood diversification.

The project also explored opportunities to strengthen existing GOB policies and strategies, improve interagency coordination to effectively

enforce these regulations, and develop local capacity for fisheries co-management. This meant that ECOFISH was a complex and multilevel intervention that integrated research and development activities across all levels. The project's strategic framework was therefore based on twin outcome pathways in which collaborative fisheries co-management went hand-in-hand with building the socioeconomic resilience of fishing communities by generating research-based solutions. Each pathway had a chain of outcomes linked with project activities and outputs to IRs. To achieve its objective of "improved resilience of the Meghna River ecosystems and communities reliant on coastal fisheries," the following four IRs supported ECOFISH:

- IR1: improved fisheries science for decision-making
- IR2: strengthened fisheries adaptive co-management
- IR3: enhanced resilience of hilsa fisher communities
- IR4: improved policy, power and incentives.

ECOFISH carried out the activities to achieve poverty reduction and other social goals of the GOB. Of these, the IRs included a number of crosscutting activities, like gender, communication, environment and capacity building.



Photo credit: Balam Mahanta/WorldFish

Fishermen with net.

Theater of operation

The project covered 12 administrative districts in Bangladesh around the Padma River and Lower Meghna River as well as important coastal areas for hilsa and other primary species of the coastal region and the fisher communities that depend on them. The main criterion for selecting the intervention area was the proximity to six designated hilsa fish sanctuaries. Other criteria were the vulnerability of coastal communities, high intensity of hilsa fishers, comparatively poor areas, illegal gear used in sensitive areas, and a demonstrated interest in co-management.

After the stakeholders agreed to these criteria, a theater of operation (TOO) was drawn up in an initial national stakeholder consultation workshop (Figure 1). The designated six-hilsa sanctuaries in the Meghna River were selected, including all the districts in Barishal Division, the districts of Chandpur and Laxmipur in Chattogram Division, and Shariatpur District in Dhaka Division. Later on, the newly declared Nijhum Dwip Marine Reserve, at the mouth of Meghna River to the Bay of Bengal, under Noakhali District, and the Rohingya refugee affected ZOR in Cox's Bazar were also included in the TOO.

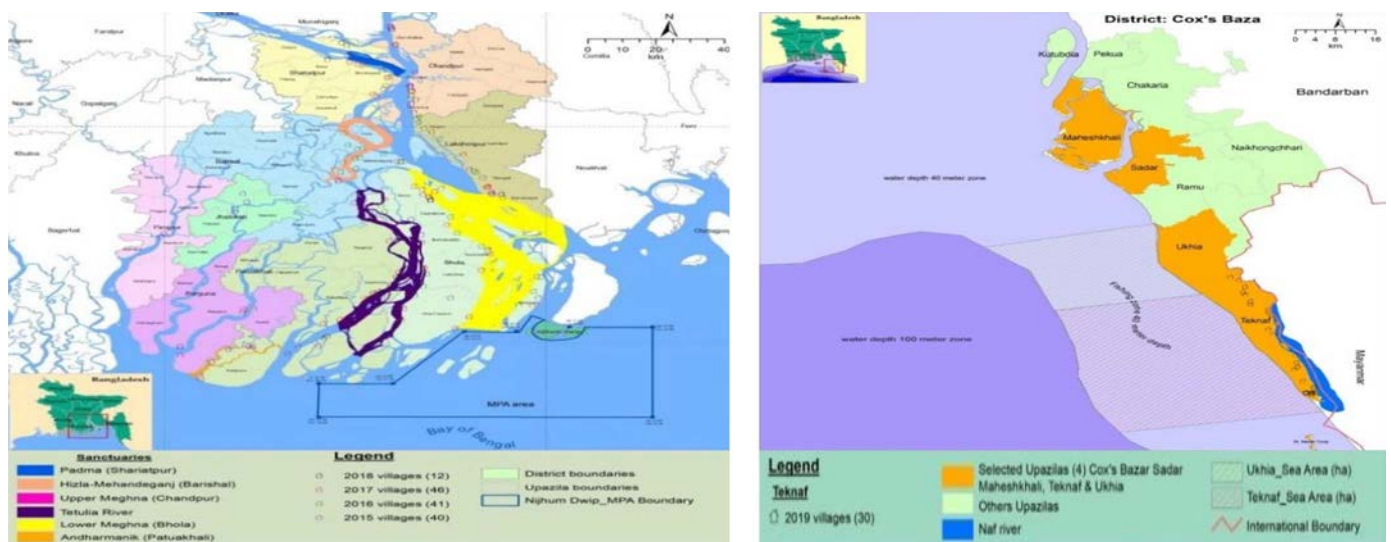


Figure 1. ECOFISH's TOO showing six hilsa sanctuaries, newly declared MPAs and the Rohingya affected ZOR areas in Bangladesh.

Theory of change

In 2014, ECOFISH organized a 3-day national stakeholder consultation workshop. This brought together a network of people with experience and knowledge of the institutions, resources, issues, needs and opportunities for sustainable management of the hilsa fishery and biodiversity conservation. The overall framework was focused on ECOFISH's theory of change (TOC). The objectives were to work on and add an initial TOC model, a causal analysis and problem articulation for the project that would form the basis for learning and adaptive management.

ECOFISH explored opportunities to strengthen existing GOB policies and strategies, improve interagency coordination to effectively enforce these regulations, and develop local capacity for fisheries co-management. To accomplish these objectives, the project played catalytic

role in managing coastal fisheries in Bangladesh. Activities were aimed at benefiting marginalized and vulnerable poor fishing communities and deliberately targeted women's well-being in fishing households to ensure their access to resources and technologies. To that end, ECOFISH designed a TOC focusing on (a) stronger sustainability of Bangladesh's complex and productive coastal and riverine ecosystems, (b) enhanced resources, (c) and improved livelihoods for fishers. These hypotheses were contingent upon practicing science-based adaptive co-management and following the EAFM (Annex 1). The TOC was revisited and updated based on lessons learned and provided a realistic basis for analyzing project impacts and organizing the project's monitoring and evaluation (M&E) framework and learning agenda.



Photo credit: Balaram, Mahabubur/WorldFish

Fishermen catching fish in boat.

Approach and principles

Consistent with the Fish Act (1950), fisheries regulations and the HFMAP, ECOFISH's implementation strategy focused on sustainably managing hilsa resources combined with strategies to diversify livelihoods and improve social capital in fishing communities. Fisheries measures included fishing closures, protected sanctuary areas, controlling, and removing illegal fishing gear. Together, these efforts sought to steer the fishery in the direction of sustainable yields. ECOFISH's interventions addressed fishery systems at multiple levels: district, upazila, union and community. They included developing stakeholder and co-management institutional capacity and providing efficient and functional co-management structures for inclusive consultation. The purpose was to better address local needs through planning and decision-making on fisheries.

The project also emphasized scaling up best management practices and innovations. This included efforts to align resource management actions with both national policies as well as those of neighboring countries that share the hilsa stock. They also included sharing lessons and best practices that emerged from the program. The most important element of the intervention was to provide vital scientific and technical knowledge to policymakers and decision-makers for coherent policy integration, planning and decision-making. To achieve the objectives, the project operated on the following principles:

1. **Adaptive planning:** This approach used inclusive platforms for multistakeholder dialogue, incorporating local knowledge and innovations, and allowing for changes in the results framework and annual workplan based on new knowledge, stakeholder-driven ideas, more clearly defined challenges, and changed circumstances.
2. **Building a foundation of scientific and technical capacity:** This built capacity in fisheries co-management, fisheries science and climate resilience within local systems (government offices, research institutes and local NGOs) and followed lessons learned from more than a decade of working around coastal fisheries.
3. **Monitoring, learning and adaptive management:** A meaningful monitoring system was developed that provided a learning platform for improved fisheries management and livelihood development through decision-making and outcomes.
4. **Research in development:** This approach helped to sustainably manage aquatic living resources. This was done in partnership with communities and was documented and shared with the public, practitioners, policymakers and the scientific community. It also assured that future lessons learned would be documented so that they can be replicated and, with sufficient resources, scaled up to affect landscape-level and transboundary outcomes.
5. **Local systems:** The primary partners and clients were national and subnational DOF officers and fishing communities. This ensured the highest levels of relevance and sustainability. ECOFISH staff were co-located with DOF staff in DOF field offices, while activities were implemented in partnership with DOF field staff. Whenever feasible, ECOFISH also built up the capacity of DOF field staff, national research institutions and local groups.
6. **Community resilience and women's empowerment:** ECOFISH targeted marginalized and vulnerable groups, particularly women fishers. The project delivered sustainable interventions that mitigate, adapt and transform household and community capacity to adapt to and "bounce back" from shocks and stresses. Increasing social capital and cohesion as well as livelihood options among poor fishing communities were important approaches and tools to achieve the project's objectives.
7. **Citizen science and community-led fisheries monitoring:** The project transformed trained boat skippers into citizen scientists. This citizen science approach, which collected fish catch data using simple Bangla apps on smartphones, was a project innovation that was successfully introduced in the artisanal fishery. A community-led fish landing monitoring system was also successfully used to get fish landing information using digital devices.

Project management

WorldFish, a CGIAR member, took the lead in implementing ECOFISH (Collaborative Agreement No. BFS-G-11-00002-00). Its main partner was the DOF at the Ministry of Fisheries and Livestock (MOFL). This partnership fell under the framework of the Technical Assistance Project Proforma (TAPP). The document was developed in 2014 under the direct involvement of the DOF, with guidance from the MOFL, and approved by the GOB's Planning Commission, the Ministry of Planning.

ECOFISH activities were aligned with the CGIAR Research Program on Fish Agri-Food Systems. Implementing the activities were key staff, such as ECOFISH's team leader and project manager, three IR scientists, a gender and environmental specialist, an M&E specialist, a training specialist, a finance officer and a communications manager. The main

project office was at the DOF's headquarters with a sub-office at a District Fisheries Office (DFO) in nine coastal districts: Barishal, Bhola, Patuakhali, Barguna, Jahalokathi, Pirojpur, Chandpur, Laxmipur and Shariatpur. In the final year of the project, another two offices were later added in Cox's Bazar and Teknaf to implement the extended tasks. A research associate, research assistant and office assistant were based at each of field office. They worked in collaboration with the relevant DFOs, upazila fisheries officers and senior upazila fisheries officers.

ECOFISH was implemented under strong management and support from the highest level of GOB administration: the MOFL and the DOF. The secretary of the MOFL headed the high-level project steering committee (PSC), while the DOF's director general led the Project Technical Committee (PTC). These committees were seated



Photo credit: Palaram Mahabadi/WorldFish

Fishers harvesting fish from a river with a net, Barisal, Bangladesh.

twice and four times a year, respectively, to monitor the project and provide guidance. Members of both committees were representatives from USAID, WorldFish, the Economic Relation Division, the Implementation, Monitoring and Evaluation Division, the Bangladesh Fisheries Research Institute (BFRI) and Bangladesh Agricultural Research Council (BARC), along with university and selected implementation partners. The MOFL appointed a project director to coordinate the implementation under the TAPP framework.

To maximize the long-term sustainability of the results, the project emphasized partnerships with government agencies, international organizations, the private sector, universities, research institutes, knowledge-based institutions,

civil society, local government institutions, fishing sector stakeholders, communities, and NGOs working in the areas of biodiversity, climate change, livelihood development, and management of coastal fisheries. The partnerships focused on implementing the interventions and strengthening institutional and individual capacity through a learning-by-doing approach and adaptive management. ECOFISH remained in close contact with similar projects both at home (e.g. Climate Resilient Ecosystem and Livelihoods, and USAID’s BAGH project) and abroad (ECOFISH Philippines, Collaborative Management for a Sustainable Fisheries (Senegal)) funded by the government and the donor agencies. The implementing partners are listed in Table 1.

Ministry of Fisheries and Livestock (MOFL) Department of Fisheries (DOF) Bangladesh Fisheries Research Institute (BFRI) Power and Participation Research Centre (PPRC) Center for Natural Resource Studies (CNRS) COAST Trust Community Development Center (CODEC) Shushilan Hathay Bunano Proshikshan Society (HBPS)	University of Rhode Island, Coastal Resources Center (URI/CRC) International Institute for Environment and Development (IIED) International Union for Conservation of Nature and Natural Resources (IUCN) Wildlife Conservation Society (WCS) International Organization for Migration (IOM)	Bangladesh Agricultural University Chattogram Veterinary and Animal Sciences University (CVASU) University of Dhaka Sylhet Agricultural University Patuakhali Science and Technology University Institute of Marine Sciences, University of Chittagong Noakhali Science and technology university Rajshahi University
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Table 1. Implementing partners.



Key results and accomplishments

Improved fisheries science for decision-making

IR1 was the project’s science component. It aimed at building a comprehensive picture of the hilsa and other important coastal fisheries to support decision-making for sustainable co-management. A key pathway of the project’s TOC was generating high quality and reliable science-based information for hilsa fisheries co-management planning and ecosystem conservation (Table 2).

Hilsa stock assessed

Hilsa stock was first assessed in 2016 and then again, in 2019 to compare the changes that took place over 3 years of interventions. During that period, the MSY increased dramatically, from 526,000 to 690,000 t, and exploitation levels and mortality parameters improved (Table 2). For these assessments, monthly length-frequency data was collected year-round using a digital image measuring technique and covered all the important hilsa habitats, such as the Padma River (Shariatpur), Meghna River (Chandpur, Barishal and Laxmipur), Meghna estuary (Bhola) and marine areas (Borguna, Patuakhali and Cox’s Bazar). The data was analyzed using FiSAT (FAO-ICLARM Stock Assessment Tools), and the assessment outputs have already been [published](#) in a reputed journal.

Allowable mesh size for hilsa gillnets

ECOFISH conducted comprehensive studies through experimental fishing involving trained

fishers (citizen scientists) and a research vessel through the BFRI. The outputs were shared with all stakeholders, both regional and central. To ensure the MSY, the project recommended mandating a mesh size of 6.5 cm or higher for all types of hilsa gillnets. Regional workshops were organized in Shariatpur, Chandpur, Barishal and Bhola, where stakeholders demonstrated the right mesh sizes for different sizes of hilsa. The central workshop was organized at the Matshya Bhaban in Dhaka, where the final decision was made in the presence of the honorable minister of the MOFL, the secretary of the MOFL and the director general of the DOF. The GOB accepted the recommendation and processed a gazette that is expected to be notified as law soon. After notification, the mesh size regulation will come into effect immediately. This will further reduce the *jatka* catch, which will help hilsa production come close the estimated MSY.



690,000

metric tons/year—MSY of hilsa



22-day brood hilsa ban period is most effective



6.5 cm minimum would be the allowable mesh size for hilsa gillnets



3 genetically different hilsa ecotypes identified

Parameters	Baseline (2016)	End-line (2019)	Implications
MSY	5260,000 t	690,000 t	Improved significantly
Exploitation level (<i>E</i>)	0.67	0.65	Improved slightly
Total mortality (<i>Z/yr</i>)	4.19	3.78	Improved
Fishing mortality (<i>F/yr</i>)	2.83	2.46	Improved
Natural mortality (<i>M/yr</i>)	1.36	1.33	Improved

Table 2. Key findings of hilsa stock assessment.

Peak spawning period of hilsa

After conducting a thorough year-round study, the project identified the peak spawning month and week of hilsa. The study assessed the gonadosomatic index (GSI) and the availability of spent hilsa covering all major hilsa habitats. The highest GSI value and highest proportion of female hilsa were in the second week of October, while the highest percentage (32%) of spent hilsa in the ovary reconstruction phase were in the first week of November. Taken together, this indicated that the peak spawning took place in the third week of October (Figure 2). From this, the project recommended implementing a 22-day ban covering this period, which the MOFL accepted.

Hilsa ecotypes discovered

ECO-FISH applied the Next Generation Restriction-site Associated DNA sequencing technique for DNA analysis. This revealed two pertinent questions:

1. Is there any parental relationship between adults and juveniles of a particular habitat?
2. Do all hilsa that migrate from marine to freshwater rivers come from the same population?

The results showed two things. First, juvenile hilsa return to their respective natal rivers for spawning. Second, divergent local adaptations in differing environmental habitats have divided the hilsa population into three genetically structured ecotypes: turbid freshwater (Padma River), clear freshwater (Meghna River) and brackish-saline (coastal and marine) ecotypes. The first output will help fishers understand that the *jatka* they save will return as adults to their river or fishing grounds to spawn. The second output suggests that a spatial management plan is needed to conserve each ecotype for sustainable improvement.

Biodiversity and threats to biodiversity

In the Meghna River, 200 fish species under 45 families were recorded, and 35 pieces of fishing gear were listed with detailed information. In the Andharmanik River, 94 fish species in 46 families were identified in 2015, and then reassessed in 2018, which revealed 15 brackish-water species newly appeared in the commercial catch. This indicated improved biodiversity in the rivers, because of the conservation approach that was adopted. The abundance and threats of

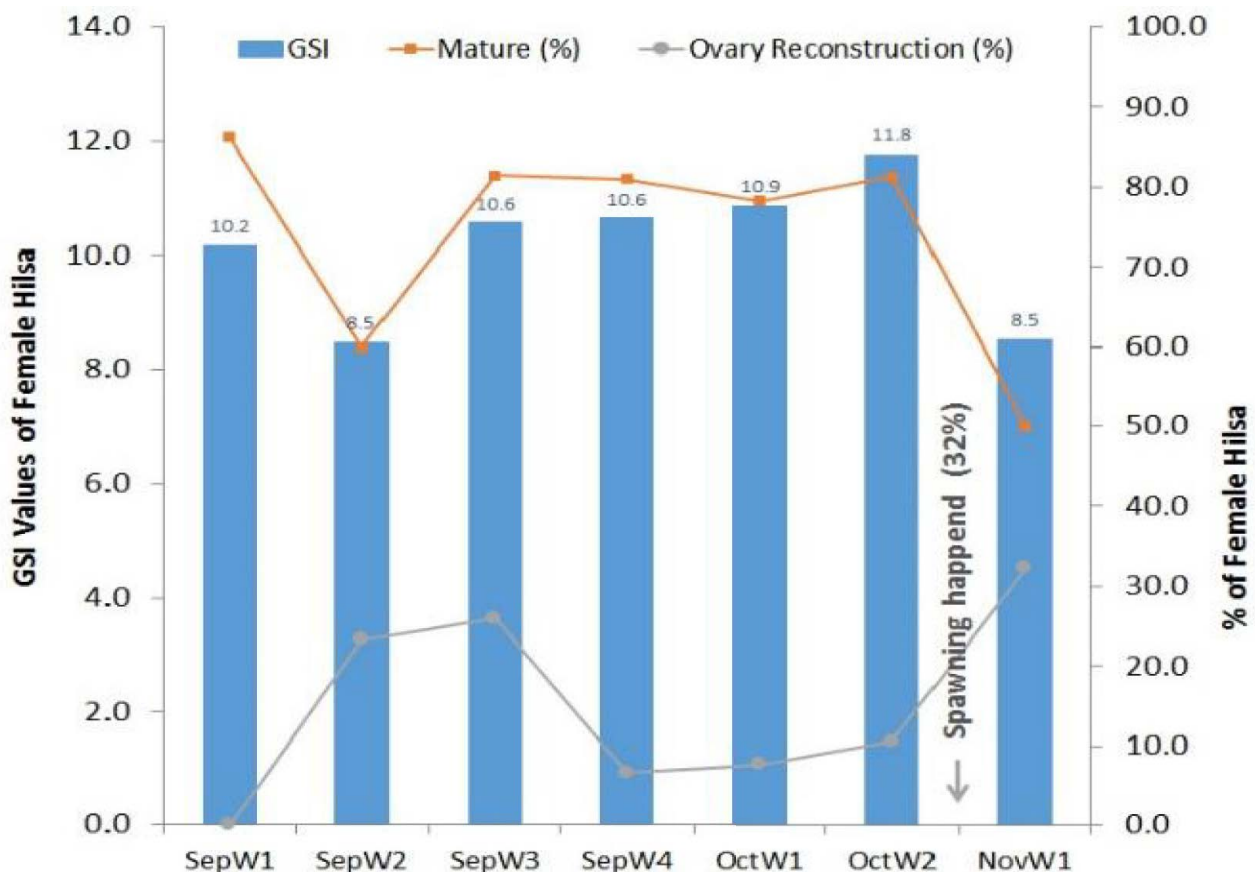


Figure 2. Peak spawning period for hilsa.

megafauna (dolphin, sharks and turtles) focusing on gillnet bycatch were assessed in the Lower Meghna estuary. In addition, Jagannath University and the International Union for Conservation of Nature (IUCN) assessed endangered wader birds, focusing on three species in particular: the critically endangered spoon-billed sandpiper (*Calidris pygmaea*), the endangered spotted greenshank (*Tringa guttifer*) and the great knot (*Calidris tenuirostris*). Among these species, the spotted greenshank and great knot were found in 10 locations along the coastal regions, while the spoon-billed sandpiper was found only in the Sonadia Island of Cox's Bazar and Nijhum Dwip of Hatia (Plate 1).



Plate 1. Spoon-billed sandpiper (top) and spotted greenshank (bottom) identified in the coastal region.

Trophic levels/food pyramids of 100 riverine species

Food webs largely define ecosystems, while the trophic levels define the position of organisms within the webs or food chain and the interactions among species. Figure 3 shows a food pyramid of 100 important fish species of the Andharmanik and the Meghna rivers that have been placed in five different layers of the food web. These are the primary producer (phytoplankton and green aquatic plants), primary consumer (hilsa and other

planktivores), secondary consumer (predators of planktivores), tertiary consumer (predators of the secondary consumer) and quaternary consumer (apex predators). The analysis indicated maximum food energy utility through different trophic level management as only 10% energy could be transformed in the form of biomass from the lower trophic level to the higher trophic level.

Hilsa aquaculture potentials

In collaboration with the BFRI, ECOFISH undertook juvenile rearing activities to evaluate the potential to produce hilsa in coastal ponds as an alternative means of livelihood during the ban periods. Initially, an **onboard trial** to breed hilsa was attempted side-by-side with a brackish-water hilsa aquaculture trial at the BFRI station in Kalapara, Patuakhali (Plate 2). For this purpose, nine 200 m² compartments were created by separating a large rectangular pond. These were fertilized and stocked in three densities (1, 2 and 3 *jatka*/m²) with three replications and reared for 9 months on natural food. Water quality and fish growth were monitored monthly. The initial total length (TL) was 7.5 cm and the weight 6.5 g. The highest growth was obtained with the lowest density in which the final size was 25 cm TL (152 g). The trials encountered several challenges, however, including extremely low survival and poor growth. From this, it was concluded that the potential of hilsa aquaculture is low.

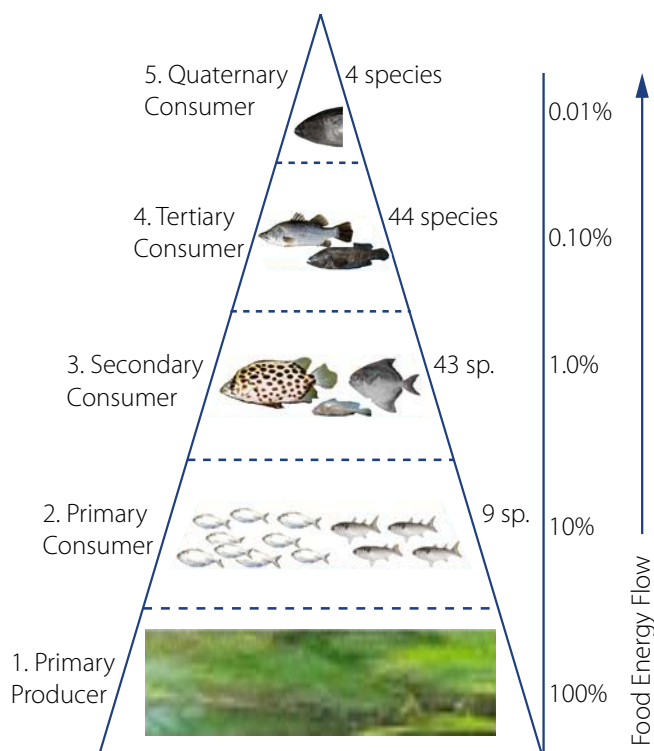


Figure 3. Food pyramid of 100 riverine fish.



Plate 2. Hilsa aquaculture in BFRI research ponds in Kalapara, Patuakhali.

Introducing a novel catch monitoring system

ECOFISH successfully piloted innovative approaches to generate reliable fisheries data by training boat skippers as citizen scientists, who send data using smartphones (Plate 3). A novel catch monitoring system was introduced into five sanctuaries and marine habitats involving 60 citizen scientists, who then efficiently provided real-time species-wise catch data directly to the database following easy-to-use Bangla apps adapted from an open data kit module.

Assessing the health of the riverine ecosystem

Water quality parameters and fish abundance:

From July 2015 to June 2016, six water quality parameters—temperature, transparency, conductivity, dissolved oxygen, pH and salinity—were monitored monthly from seven key sites, both inside and outside the sanctuaries. The data was correlated to fish abundance in terms of catch per unit effort (CPUE). However, a [multivariate analysis](#) suggested weak relationships between the water quality parameters and fish abundance.

Riverine pollution: To know the status of general water quality and pollutants, 17 parameters (12 physicochemical parameters and 5 heavy metals) were monitored from 2016 to 2017. These focused on 11 strategic locations in nine major rivers: the Padma, Meghna, Buriganga, Dhaleshwari, Ichamati, Tentulia, Andharmanik, Bishkhali and Kalabadar. All the rivers showed lower transparencies during the monsoon season and higher phosphate (PO₄) levels in the dry season. The ammonia (NH₃) level was above the acceptable range in the Buriganga, Dhaleshwari and Padma (Shariatpur) rivers. Among heavy metals, copper (Cu), zinc (Zn) and iron

(Fe) were within acceptable levels in every river; however, manganese (Mn) was higher than the acceptable level (0.5 mg/L) in all rivers, ranging from 0.8 to 8.2 mg/L. Similarly, chromium (Cr) concentration was higher than the acceptable level (0.05 mg/L) in the Buriganga, Dhaleshwari and Meghna (Lakshmipur) rivers, ranging from 0.14 to 0.40 mg/L. The Buriganga River is the most polluted followed by the Dhaleshwari River, both of which are located around Dhaka. A detailed assessment report was put forward to the GOB to take necessary measures to reduce the pollution in the major rivers in and around the city.

Oil-spill assessment in the Sundarbans:

In December 2014, an oil tanker collided with a cargo ship on the Shela River in the Sundarbans—the most important protected mangrove forest in Bangladesh and a UNESCO World Heritage Site. The oil spill stretched through more than 35 miles of rivers and canals in the Sundarbans. This resulted in a heavy pollution that threatened biodiversity in the area. To assist the GOB, ECOFISH immediately provided all sorts of technical and financial support to put together an impact assessment team formed from the MOFL and DOF. To assess the impacts, the project worked with USAID to bring in three senior-level experts from the National Oceanic and Atmospheric



Plate 3. Citizen scientists.

Association (NOAA), University of California-Davis and United States Coast Guard. This rapid response contributed to a quick impact assessment of the oil spill and suggested short-term and long-term mitigation measures.¹

Formulating value-added hilsa products

Three boneless hilsa products—soup, noodles and cubes—were formulated with technical help from the Bangladesh Agricultural University and assistance from a private entrepreneur, Virgo Fish and Agro Process Ltd (VFAP). The honorable minister of the MOFL officially handed the production technologies over to VFAP for commercial production and marketing.

National Hilsa Research Strategy (2020–2030)

From January 18 to 19, 2019, in collaboration with the DOF and the BFRI, ECOFISH organized the National Workshop on Hilsa Fishery Development and Management Strategy in the Conference Room of the DC Office in Chandpur. The main objective of the workshop was to review past and present research on hilsa and identify future research and development areas. Dr. Dipu Moni, MP and honorable minister of the Ministry of Education, attended the program and graced the occasion with valuable guidelines. Md. Raisul Alam Mondal, the secretary of the MOFL, attended the seminar and outlined the research direction for

next 10 years (Plate 4). Through this workshop, future hilsa research topics were identified and research strategies formulated.



Plate 4. Dr. Dipu Moni, MP and minister of the Ministry of Education (middle), and Md. Raisul Alam Mondal, secretary of the MOFL (third from right), at the National Hilsa Workshop.

Strengthened fisheries adaptive co-management

ECOFISH's objective for adaptive co-management was to strengthen fisheries through increased capacities and stakeholder engagement in the coastal fisheries of Bangladesh. In the past, the hilsa fishery management system was, in general, top-down, not consultative. It left no space for the fishers and other actors in the value chain to participate in the decision-making process.



In its place, the project switched to a bottom-up approach that engaged resource-dependent stakeholders. This helped build up an adaptive co-management system in the six designated hilsa sanctuaries through a trial and error process that followed the lessons of [community-based fisheries management](#) used in Bangladesh as well as other countries, such as Senegal, Gambia, Malaysia and the Philippines. The interventions started at the community level because strengthening community is crucial for establishing a successful co-management system. Although the DOF was the main implementing partner, ECOFISH established a local-level partnership with three national NGOs: the [Center for Natural Resource Studies \(CNRS\)](#), [COAST Trust](#) and the [Community Development Centre \(CODEC\)](#). All three had prior experience working in inland and coastal fishing communities for accomplishing the co-management. In addition, the [Coastal Resources Center \(CRC\) at the University of Rhode Island \(URI\)](#) was engaged as an intellectual partner to provide technical advice to the project.

Understanding and rolling out fisheries co-management

To understand the current level of experience and knowledge on co-management, ECOFISH organized several consultation workshops and conducted studies² and exposure trips both at home and abroad. During the workshops, experts from WorldFish, various sub-implementing partners and the DOF presented theoretical analyses and case studies on collaborative management in open water systems in Bangladesh. These included lessons from several donor-funded projects that addressed co-management or community-based management. In addition, the CRC-URI provided technical expertise to set the modality and test the model in the Andharmanik River sanctuary as a pilot site. The CRC-URI also designed and delivered a 3-week fishstock assessment and a hands-on co-management training course for Bangladeshi practitioners. Along with the assessment, the training introduced coastal and marine fisheries co-management theory and practices around the world (Plate 5).

Rapid assessment on fishing villages and landing centers

As a first step, the project conducted a rapid assessment³ to understand the characteristics

of fishing communities and fish landing centers (*ghats*), the existing nature of fishers associations and community-based organizations (CBOs) and the challenges of establishing riverine co-management. The study reviewed the management measures in the HFMAP, especially those in the areas of co-management. The assessment, however, recommended an inclusive approach to fisheries co-management by increasing the involvement of fishers, as well as fish traders at landing centers and along government officials. The study showed that community participation in fisheries would be the best option for conserving the ecosystem and that the fishing villages could be the first place for the ECOFISH intervention.

The candlelight approach for fishing community selection

With fishers and the current governance system in mind, ECOFISH mobilized fishers in the communities and landing centers to create a platform of collaborative and participatory management. In its first year (2015), the project selected 40 fishing villages for interventions, and over the next 2 years it gradually included 136 more, to go with the six hilsa sanctuaries (Figure 4). Google Maps was used to select the villages, following the candlelight approach. This was done to spread the message “[conservation is development](#)” among the nearby villages, as well as the hilsa sanctuaries, where the majority of hilsa fisher households are vulnerable to climate change.

Community profiling

In the early stages of establishing fisheries co-management, the most important intervention was community profiling. Using participatory tools, it helped to understand the socioecological



Plate 5. Participants at the fishstock assessment and co-management training workshop in Barishal.

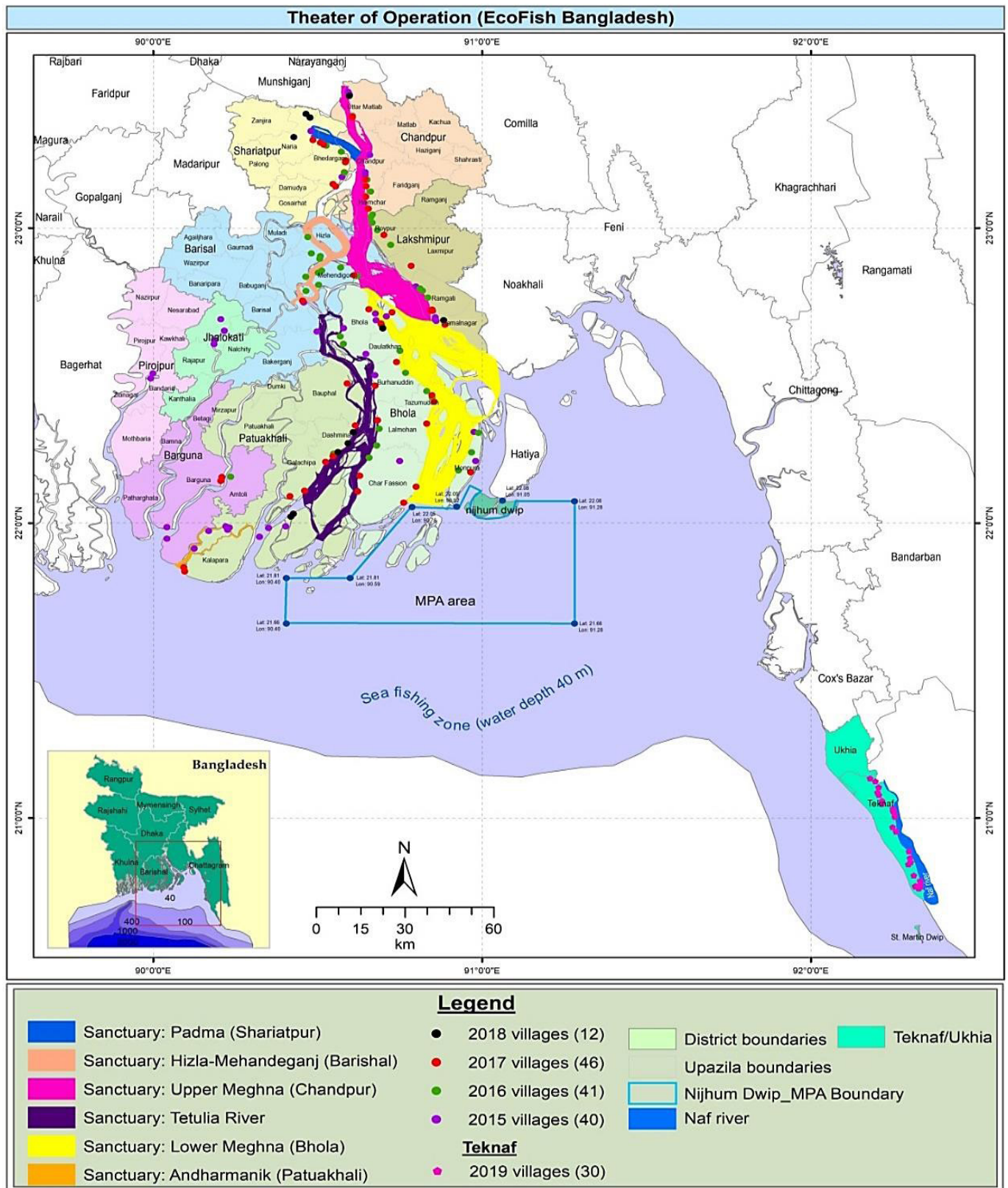


Figure 4. Hilsa sanctuaries surrounded by project fishing villages and fish landing centers.

context, vulnerabilities, resilience capacities and current state of fisheries governance (Table 3). This profiling built trust in the fishing communities and encouraged stakeholders to engage in different co-management building blocks, like HCGs, HGGs and CSGs. The project gradually reached to 20,000 households over a large area covering the greater Barishal Division in the south and the divisions

of Laxmipur, Shariatpur and Chandpur in the northcentral region. Generally, each household had five members. This meant that about 100,000 family members (about 50% of whom were women) of fishers benefited directly from the project. From the targeted households, members were selected for the HCGs, CSGs, CFGs and HGGs.

Tool	Why was it used?	How was it used?
Transect walk	To get an overall scenario	For selecting targeted communities
Group discussion	To identify problems related to the community and fisheries	As an initial icebreaker to start identifying fishers
Social mapping	To understand the geographical characteristics and social services	For identifying targeted fishers communities
Well-being analysis	To identify the poverty level of fisher households	Inclusion in informal groups (e.g. HCG) according to wealth
Institutional mapping and network analysis	To investigate formal and informal fisheries and community institutions	For using related institutional actors in fisheries co-management
Stakeholder analysis	To understand the enterprising behavior of fisheries actors	For engaging stakeholders in co-management
Harvesting LEK	To understand LEK on various aspects of hilsa fisheries, trends of fishing practices and river dynamics	For taking appropriate management measures
Identifying shocks and stressors	To understand vulnerabilities, shocks and stressors	An intervention design to improve resilience capacities
Livelihood status of the community	To understand socioeconomic status and identify possible areas for AIGAs	For creating socioeconomic indicators to measure change and livelihood intervention design
Seasonal calendar	To understand annual economic activities, species abundance, fishing and livelihood practices	As an intervention design and management measures
Ranking problems according to priority	To identify the root causes of the problems	Community development planning
Biodiversity assessment	Threat and abundance analyses	For local conservation actions
Ecosystem profiling	To understand river resources	Management planning
Fisheries management and community development plan	To facilitate fisheries management and a community development plan	For empowering fishing communities
Validation workshop and community kickoff meetings	To gain consensus and validation at the village level	For increase understanding of fisheries co-management

Table 3. Outcomes of community profiling.

Gender analysis

Initially, ECOFISH conducted a rapid gender assessment⁴ with a view to gender integration in all aspects of project interventions. After that, ECOFISH conducted a gender analysis in every intervened village during community profiling, because gender cut across all project activities through economic and livelihood strategies, social structures, cultural norms and ideologies, and policies. The gender analysis was the first step toward gender mainstreaming in fisheries management. Using the Women's Empowerment in Agriculture Index [framework](#), the analysis showed that women in

fishing households were well behind their male counterparts in every domain, in both economic disparity and decision-making processes (Table 4).

Developing co-management building blocks

ECOFISH formed several [building blocks](#) (HCGs, CSGs and HGGs) through the participatory community profiling exercise in the 136 fishing villages located along the river watercourses. 575 HCGs were formed involving 19,534 fishers (30% of whom were women) who preferably had fisher ID cards (Figure 5). Similarly, 63 HGGs were formed in landing centers to engage value

Attribute	Status during project inception	Change
Gender norms and attitudes	Fishing and related value chain activities are a man's job. Women cannot participate in income-generating activities.	Positive changes and critical consciousness were observed regarding unequal gender norms and attitudes.
Gender division of labor	Men usually work outside and go fishing for their livelihood. Women are responsible for all household chores and usually have no access to work outside.	Livelihood skills and options have been created for the targeted women and they are participating in income generating activities.
Access to resources	Men own all fishing gear and vessels. Formal microcredit loans are provided to women who are usually invested in fishing-related activities. Women usually do not have any cash in hand or savings.	CSGs were introduced and formed exclusively for women. Women are building savings and running their enterprises by borrowing money from the CSGs.
Control over income and assets	No matter who is the owner of assets and income, men have control over all tangible and intangible assets.	Through the institutional structures and guidelines of CSGs, women are enjoying full control over their savings and investments.
Expression of agency (choice and decision-making)	Most of the women are not directly involved in major decision-making processes at the community level; however, some make household decisions jointly with their male family members.	Women's economic empowerment is helping them make strategic life choices. Starting with CSG-level decisions, they are now participating in community-level decision-making processes.
Access to education	The educational status of women is better than that of men because of government incentives, and also because boys are often involved in fishing practices from childhood. However, most women do not have a vocational education.	Women have received business literacy and life skills through BLSs.
Leadership	Only men can belong to a fishers association and participate in fisheries-related decision-making activities. Men control community-level leadership.	Women can voice their opinions and practice leadership through CSGs and HCGs. Economic empowerment has enabled them to practice leadership roles.

Table 4. Changes in gender dynamics the fishing communities.

chain stakeholders, such as *arotder*, *mohajon*, boat owners, fishers and laborers. 148 women-led CSGs were formed across all the villages, with at least one in each village. The CSGs were selected from the most poverty-stricken fisherwomen among the households. The focus of the community savings scheme was gender mainstreaming, and this intervention was considered the best practice of ECOFISH. As a result of the CSGs, women's access to finance and improved technologies and resources were increased, along with better access to easy and interest-free soft loans (only a service charge required). This reduced their dependency on high-interest loans from external, nonformal credit providers.

Over 3 years, ECOFISH thoroughly developed various building blocks and increased the capacities of fishers through various meetings and training sessions. After this, an FMC (the apex CBO body) was formed in each village. These committees all followed the EAFM. The FMC structure was formed with significant representation from the HCGs, CSGs, HGGs and CFGs: 72% of the members came from fishing households, while 10% were fish traders and the rest were made up of representatives from business people, religious leaders, elected representatives, teachers, youths and social elites. Women accounted for 28% of the committee members.

The FMCs focused on gender integration in the first tier of fisheries governance at the village level, and organized training sessions, meetings and awareness-building campaigns helped strengthen the capacity of the committees. The FMCs are now used as a platform in the communities for stakeholders to make hilsa fisheries conservation plans, implement sustainable hilsa and fish catch decisions and promote compliance with government rules and regulations for managing the hilsa fishery (Plate 5).

It took 2 to 3 years to build the co-management committees at the upazila level and about 4 years to form them at the district level. The co-management activities started with forming building blocks in fishing communities and at landing centers and took about a year to cover all six sanctuaries. The [initial steps of co-management](#) played a crucial role in building the foundation for adaptive learning and helped organize several informal and formal groups and build their capacities.

The HCG graduation approach to capacity building

Capacity building was a key strategy of ECOFISH in achieving positive changes in both economic and social behavior. The project followed an HCG graduation approach to educate participants and organize the HCGs



Figure 5. Organization of co-management building blocks.

to become capable of acting as an entry-level platform for fisheries co-management. The central goal of this approach was to reach zero violations in compliance with best fishing practices and to help fishing households exit extreme poverty by involving them in AIGAs during the fishing ban periods (Plate 6). This included organizing 24 training sessions over 3 years after forming the HCGs (see page 56).



Plate 6. HCG members (both men and women) met once a month and participated in learning sessions.

Establishing co-management and good governance

ECOFISH introduced the first-ever adaptive co-management approach in the large Padma-Meghna river systems that encompass the hilsa sanctuaries in Bangladesh. The project piloted the co-management system in the Andharmanik River sanctuary in Patuakhali coastal district and then gradually stretched this approach into different areas of the six sanctuaries. Over the project period, ECOFISH worked with [hilsa co-management committees covering 30 unions, 18 fish landing centers, 13 upazilas and 6 districts](#). The process remained steady throughout the interventions, starting with different community-based co-management building blocks and ending with the formation of district co-management committees through a logical representation from every stakeholder of resource users (Figure 6).

The project developed a co-management structure through a learning-by-doing approach. This consisted of four layers of local-level decision-

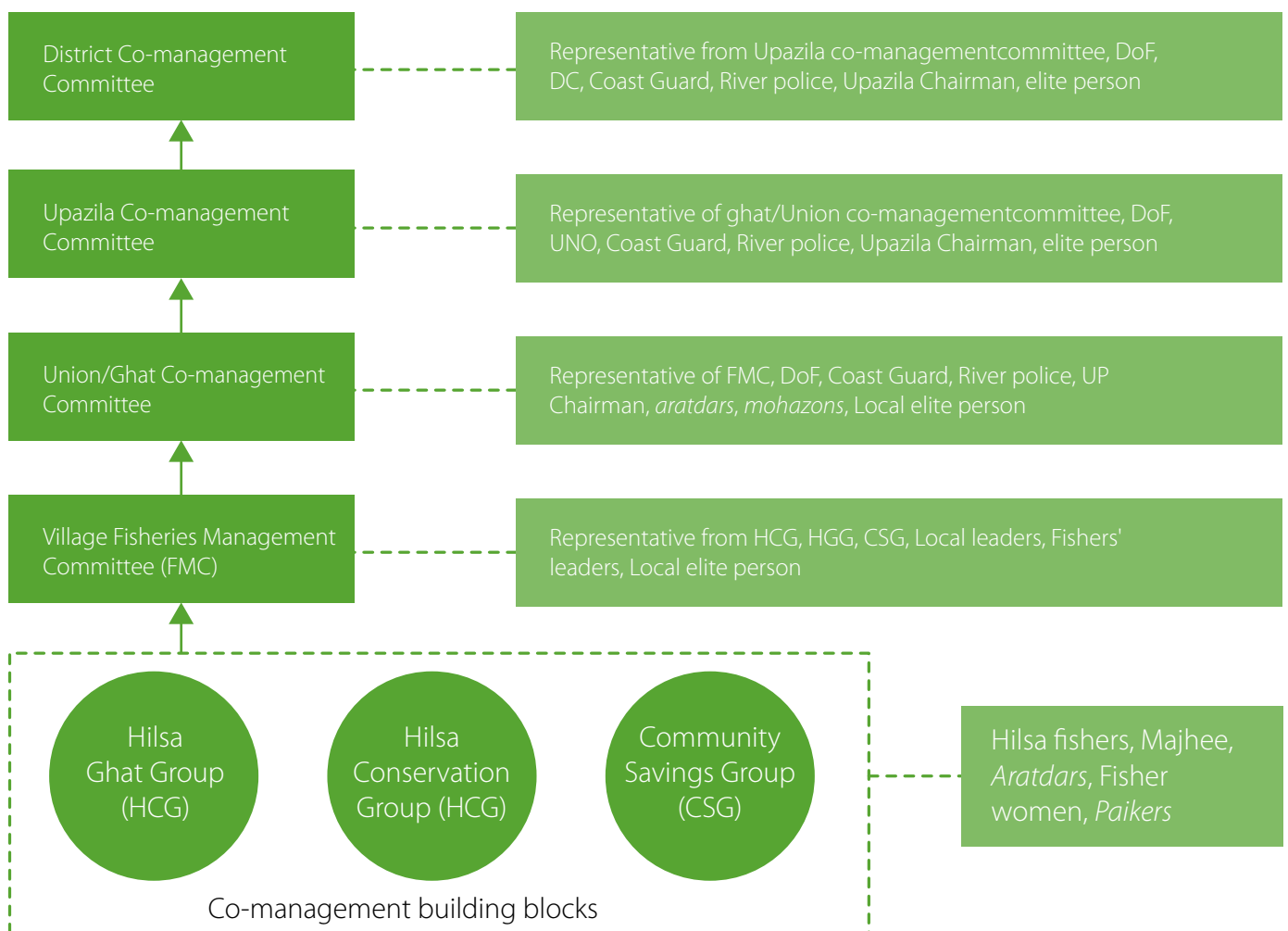


Figure 6. Hilsa fisheries co-management structure, and representatives in the committees.

making and an implementing authority (Figure 6). The main function of the committees was to take part in planning resource conservation and motivating the stakeholders to implement the plan. The main terms of reference of the co-management bodies were to conserve fish biodiversity in the rivers, increase hilsa and other fisheries production, build awareness on complying with government rules and regulations, generate supplementary or alternative income, and implement government directives. In addition, the committees played an important role in recruiting CFGs, conducting boat and net censuses and assisting the government to provide boat licenses and government IDs. They also helped with rice (food incentive) distribution and conflict resolution.⁵

The first layer of decision-making was the village-level FMC and the final layer was the district-level co-management committee (DCC) followed by upazila and union (ghat) based co-management committees. District, upazila and union-based committees were aligned with conventional governance structure in the country. The ghat-based co-management approach is used only outside the administrative hierarchy.

Establishing adaptive co-management in a large river ecosystem was challenging, but the effort produced an example of [fishstock recovery](#) with [increased income](#) among the fishers. It also showed the potential for strong and coordinated multisectoral engagement to improve overall hilsa governance. Although the DOF played a significant role in establishing the co-management system, the efforts need to be continued and then upscaled in the larger areas and mainstreamed into national hilsa fisheries management initiatives. The DOF must also play an active role in institutionalizing co-management bodies within the legal framework of the government through sustainable funding to make sure these committees remain active and functional. ECOFISH research suggested ensuring a secured [tenure system](#) through [adaptive co-management](#). This would be supported by sustainable finance for livelihood improvements outside of natural resource exploitation. An ecosystem-based management approach, such as the EAFM, is another area to address the multiple challenges and multistakeholder engagement in the use of shared resources. ECOFISH began developing such a large-scale and inclusive management system by

developing national and local-level capacity on the EAFM (see page 57 and 72).

Developing community fish guards

Introducing CFGs was an innovative step by ECOFISH. This was done using examples from other maritime countries, like the Philippines, where communities join with authorities to strengthen the conservation of natural resources. CFGs act as an auxiliary force of the DOF and other law enforcement agencies, such as the coast guard and river police, to promote compliance with fishery regulations, particularly fishing bans, for hilsa and other aquatic biodiversity conservation (Plate 7).

ECOFISH introduced this activity after a tripartite central-level meeting in 2017 involving the DOF, coast guard and river police. The project then gradually enlisted 400 local fishers as CFGs from members of HCGs to cover the co-management sites as well as the six-hilsa sanctuaries. [Various stakeholders](#) appreciated the approach of CFG engagement in community surveillance. ECOFISH experience suggests that this participatory approach could be very useful in [improving compliance](#) during the hilsa fishing ban period. Current deployment is one CFG per kilometer, but two CFGs per kilometer on both sides of the



Plate 7. Having CFGs patrol the Meghna River increased compliance.

hilsa sanctuary areas would be more effective. This would provide effective surveillance over the entire hilsa sanctuary area.

The “learning to practice” approach for building awareness

In all six hilsa sanctuary areas, ECOFISH focused on spreading the message “Conservation is Development.” This was meant to create awareness among stakeholders and bring about behavioral change in the areas of ecosystem management, ecofriendly fishing, biodiversity conservation and the prohibition of illegal fishing gear. The project organized several awareness-building events, erected signage and published posters and leaflets to educate fishers and stakeholders about the importance of hilsa and other fish and megafauna conservation efforts. Electronic, print and social media were used to enact positive changes in behavior among the stakeholders (see page 50-51).



Worked in 136 villages under 92 unions and 32 upazilas in 10 coastal districts



Worked with 575 HCGs involving 19,534 fishers (30% of whom were women), 63 HGGs and 136 village-level FMCs



Engaged 400 CFGs in 13 upazilas under 6 hilsa sanctuaries



Formed 13 upazila co-management committees in 6 districts with 17% women members



Improved the biophysical condition of 369,159 ha among the six sanctuaries and newly declared MPAs



Trained 5839 people (57% of whom were women) in sustainable NRM and biodiversity conservation

The gendered approach in fisheries co-management

The project emphasized the influence of women in fisheries governance. This resulted in increased sustainability and conservation. Based on the premise that women have a positive role to play

in decision-making regarding hilsa conservation, the project ensured that at least 30% of the members of the HCGs were women, and including women in the HCGs made a difference in better decision-making. The project also ensured women’s participation in the union, upazila and district co-management committees. This gave women the scope to improve their livelihoods and social status through economic empowerment by accelerating their resources.

FWCs were another potential platform to involve women in fisheries co-management. The project organized the annual event in line with International Women’s Day. The congress aims to inspire and motivate women to play a stronger role in conserving hilsa, maintaining biodiversity and building resilience in the river ecosystems. It is a unique platform, not only in Bangladesh, but also in the entire region. The congress empowers women and encourages them to play an appreciable role in natural resource management and community decision-making (see page 50).

Enhanced resilience of hilsa fishing communities

At the core of this component were activities to strengthen the resilience of the fishing communities in terms of economic well-being, social capital and resilience to natural hazards. ECOFISH addressed these activities in twin impact pathways: providing AIGAs and establishing a co-management system for coastal fisheries. The interventions enhanced community resilience among marginalized and extremely poor fishers, particularly women, by increasing access to financial services and improving savings behavior, which would be reducing their risk to climate-affected shocks and stresses. As a result, the fishers showed much better compliance with the hilsa fisheries management rules and regulations.

Livelihood diversification, mobilizing collective action in support of resilient livelihoods, and increasing access to financing for fisherwomen were central to this component. Targeted households received a choice of productive assets aimed at assisting them in fulfilling their basic needs, generating alternative and supplementary income, and enhancing their productivity. This was accompanied by skills training specific to the assets provided. On top of all this, targeted women were

enrolled in village-level CSGs that provide business opportunities and access to microfinance from their savings. ECOFISH implemented the livelihood interventions program through the partnerships with the **CNRS**, **COAST Trust** and **CODEC**.

Value chain actors and support services

ECOFISH formed a partnership with **iDE Bangladesh** to develop implementation strategies that focus on understanding the challenges of market systems around creating sustainable economic and livelihoods opportunities. This study provided background information on the local market context and identified interventions in the hilsa market system (Figure 7). This was done using an intervention logic analysis framework and recommended the high potential of IGAs relevant to the hilsa fishers and communities. There were seven recommendations:

1. Establish appropriate, feasible and marketable AIGAs among fisher households.
2. Improve the effectiveness of existing policies and mitigation efforts to support small-scale fishers during the ban period.
3. Improve law enforcement accountability.
4. Strengthen organizational structures of community institutions.
5. Establish co-management practices among market influencing stakeholders.
6. Increase broad acceptance and awareness of female participation in AIGAs.
7. Improve access and management of appropriate financial services among fisher households.

The initial research helped ECOFISH undertake context-specific interventions to improve the livelihood resilience of coastal fishing communities.

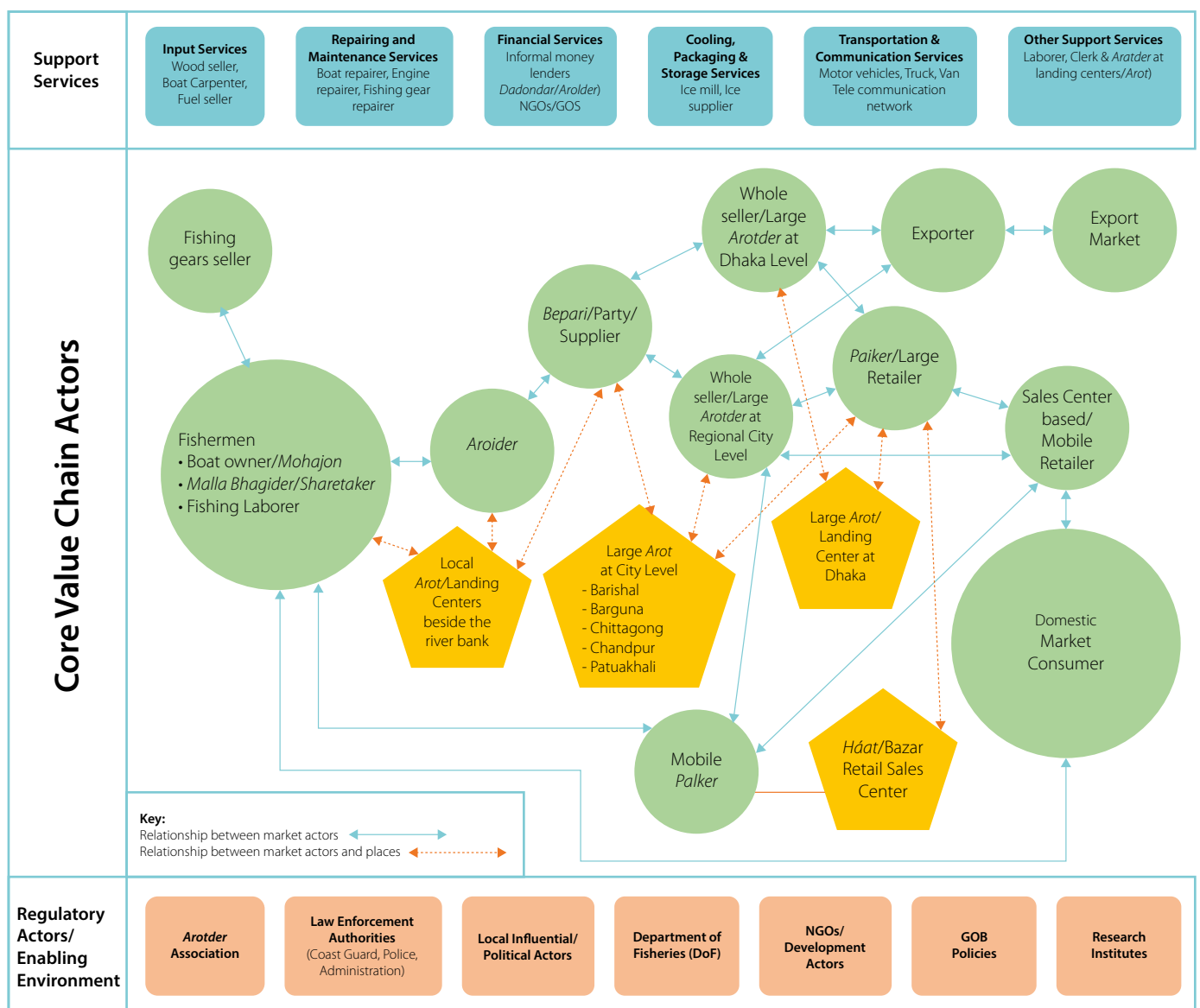


Figure 7. The hilsa market system in Bangladesh.

Livelihood interventions

The project did community profiling in all 136 villages and conducted a well-being analysis to identify the needs and priorities of different individuals in fishing communities. Fishing households were divided into four poverty categories: extremely poor, poor, lower middle class and middle class. The participants themselves did this, and the categories were determined according to the World Bank's [wealth ranking methodology](#).

ECOFISH targeted its livelihood improvement interventions at those in the extremely poor and poor categories. Planning livelihood support started with a community profiling exercise through focus group discussions and key informant interviews, which included identifying existing and potential options for AIGAs. During the exercise, community members ranked the AIGAs in order of preference. After that, ECOFISH offered the HCG members (targeted fishing households) suitable alternative livelihood and income generation options based on local suitability, comparative advantages and demand. Among the existing on-farm AIGAs, the most commonly preferred options among both women and men were vegetable production, cooperative crop cultivation, poultry rearing, goat or sheep husbandry, raising cattle for beef, and both fishpond culture and cage aquaculture. In addition, some non-farm AIGAs were practiced by women, including tailoring, making *tupi* (cap) and *hogla* mats, while rickshaw pulling was a male-only AIGA. Context-specific livelihood support—groceries, solar panels, community safe drinking water, sanitary latrine, cooking stoves, etc.—were provided to support resilient livelihoods.

Community savings groups

Fishing households have virtually no access to flexible, low-interest credit services customized to the local context. Whenever fishing households face economic shocks, they borrow high interest loans from different formal and nonformal moneylenders, especially during brood hilsa and *jatka* fishing ban periods. Loans from NGOs are taken in the names of women because the organizations do not trust male members. While women are the loan borrowers, they are very vulnerable because they have no rights to use the money nor any decision-making power.

They have virtually no access to and control over resources and are unable to participate in any income generating activities. Moreover, fishing communities tend not to invest in entrepreneurship unrelated to fish, which further limits the options for women.

ECOFISH established CSGs exclusively for women in the project's 136 fishing villages. Unlike other microcredit institutions, these had unique key features, such as no collateral required to borrow loans from the savings and no deposition or payback necessary during hilsa fishing ban periods. Over the duration of the project, ECOFISH formed at least one CSG with 30–35 poor women fishers in each project village. The members contributed a small amount of money to the savings scheme, and when their collective deposits reached to BDT 25,000, ECOFISH matched this amount. This encouraged the women to increase their savings, which helped to lend money to women in need.



4125 women are enrolled in 148 CSGs with cumulative savings of USD 159,210



3950 CSG members received loans from CSG and invested in microenterprises



120 BLSs established to educate 3758 women CSG members

There are now 148 CSGs involving 4125 women with a total savings of approximately BDT 13,373,000 (USD 159,000). The CSGs started disbursing self-help credit to local popular profitable businesses and trades. So far, 4125 women have received soft loans from their CSG fund—some of them two or three times. These women reinvested their money in different businesses, such as tailoring, goat rearing, cattle raising, commercial gardening, and grocery. Each loan recipient is expected to repay her loan in 10 installments over 10 months, along with a 5% service charge that was added to their capital and deposited in the bank. The project implemented BLSs to provide basic literacy, loan and business management skills to CSG members to engage them in entrepreneurship. ECOFISH successfully

established 120 BLSs for 3758 women CSG members (see page 57 and 72).

Support for resilient livelihoods

ECOFISH supported all its beneficiary households with seeds for homestead vegetable production twice per year: once in summer and once in winter. In terms of household consumption, the benefits were substantial against the low initial investment. The harvest of winter vegetables coincides with the March–April fishing ban in sanctuaries, so it provides much-needed household nutrition and income during this period of hardship. It also helped bring about positive changes in farming behavior. Cooperative vegetable gardening was also introduced for livelihood diversification and to enhance social cohesion for fishing households. The use of organic fertilizers and pheromone traps was encouraged to reduce environmental pollution in the respective areas. Community-based cage fish culture among fisherwomen was introduced as a collective effort. ECOFISH also promoted improved hygienic dried fish processing technology through the women producers group.

ECOFISH beneficiaries preferred poultry and small ruminants (goats and sheep) as AIGAs, because they offer clear advantages in consumption and sales. Hundreds of fishing households now own three to four goats as capital assets. By the end of ECOFISH's 4th year, target communities had earned BDT 16,449,000 (USD 205,000) from goat rearing. Together, they own about 15,295 goats. Some of the fishing households bought she cows from the benefits of goat rearing, and now own calves and getting milk regularly. ECOFISH also provided productive assets to promote non-farm entrepreneurship as AIGAs, such as tailoring, handicrafts, fishing nets and other small businesses.

Among the climate refugees most in need of help were the boat-fishing households. ECOFISH provided solar panels and improved portable cookstoves to the boat fishers, who live full time on these boats (Plate 8).



19,800 fishing households received livelihood supports were engaged in sustainable AIGAs



12,962 people (58% of whom were women) trained in livelihood development skills



Plate 8. Boat fisher households with an ECOFISH-provided solar panel.



Box 2. Establishing climate justice: The case of the floating boat fishers in coastal Bangladesh

There are about 50,000 floating boat fishers (*Nouka Basi Jele*) from a nomadic group of people living on the Meghna River. All household activities are performed inside the boats, including cooking, eating and sleeping. None of the boats has electricity, so household activities and educating children are quite challenging. Fishing is the only livelihood option, and it is transmitted to generation after generation. These people are generally deprived of different social safety nets provided by the government and other relevant agencies. Considering their vulnerability and disadvantaged situation, ECOFISH extended its support to the boat fishers through different livelihood interventions—most notably solar panels and improved cooking stoves—which increased child education.



“ I am so proud of what I can now do with this funding. It gives me a way to contribute to my family by growing my goatherd. We now have funds to help run the family when my husband cannot go fishing during the ban period.

– Nurjahan, CSG member ”



“ I am happy and grateful to USAID/ECOFISH for changing my life. I can now earn money and contribute to my household. My honor and value have increased in my family and within the community as well. I support my family during the ban period so that my husband can comply with government rules and regulations.

– Maloti Rani, CSG member ”

Connecting the export market

To introduce climate-resilient AIGAs, ECOFISH, in partnership with the Hathay Bunano Proshikan Society, trained women beneficiaries in making pebble products, which are handcrafted, and handknitted toys and clothes for children made from soft stitching. This project activity gave poor, women fishers the opportunity to start a social business enterprise of their own. Instead of offering microcredit, like many NGOs, this alternative income option provided a private sector link to an established overseas market. Women from hilsa fishing households, often members of CSGs, collectively produce these soft toys. A total of 1000 women fishers were trained, and 300 are still involved in this activity.



“ I dreamed for a long time to do something for women. They were all sitting at home idle because there was no work here for them. Now they can earn money from making pebble toys. These women have never earned money in their life, and now they have this opportunity. From the first month, we began earning money, and we hope to earn more in the future.

– Reshma, CSG leader ”

Improved policy, power and incentives

IR4 (policy, power and incentives) emerged at the stakeholders inception workshop held in late 2014. The purpose was to support three IRs in ECOFISH's TOC. Since then, IR4 has encompassed improving policies, streamlining power and supporting sustainable incentive mechanisms for coastal fisheries management. Along with other components, it provided policy support to strengthen the well-being of ecosystems, enhance livelihood resilience and reinforce fisheries governance to sustain capture fisheries production and biodiversity conservation.

The project gathered scientific information and transferred the research outputs to resource users and policymakers. A vibrant communication

approach was followed to reach a wider audience for promoting science-based fisheries management issues in order to formulate user-friendly policies. This included [science sharing workshops](#), [participation in media talk shows](#), writing journal articles (Annex 2), [publishing blogs](#) and also organizing meetings with [co-management committees](#) to communicate the science. The project also used its two government platforms (PTC and PSC) to continue to advocate for influencing policies in order to improve fisheries management practices in Bangladesh. Finally, ECOFISH produced a number of research outputs and submitted them to the government to obtain long-term policy outcomes by influencing these policies (Table 5).



Fishers pull in their nets.

Policy/custom change	ECOFISH contribution	Management implications
Brood hilsa ban extended from 11 to 22 days and made more effective	ECOFISH recommended an appropriate 22-day brood hilsa ban, which the GOB accepted in 2016. The project arranged engagement events of several stakeholders at both the grassroots and high official levels to bring the science outputs to all stakeholders.	Improved spawning success and increased <i>jatka</i> recruitment.
Hilsa Conservation and Development Fund (HCDF)	ECOFISH created a revolving fund amounting to BDT 35 million (USD 500,000) in 2017 for hilsa conservation and development.	Extended livelihood support to poor fishers and provided incentives to CFGs.
Say “NO” to hilsa during the Bengali New Year (<i>Nababarsha</i>)	Using social media platforms to spread awareness, ECOFISH campaigned not to have Ilish as part of the festivities for the Bengali New Year (<i>Nababarsha</i>). In support of this effort, Prime Minister Sheikh Hasina declared in 2017 that she would not have hilsa on the menu during the celebration of Pahela Baishakh , the first day of the Bengali New Year.	Decreased illegal <i>jatka</i> fishing and reduced unusual price hikes on the eve of the Bengali New Year.
Introduction of a sixth hilsa sanctuary	In collaboration with the DOF and BFRI, ECOFISH provided technical support to the MOFL and facilitated delineation and declaration of a sixth hilsa sanctuary. The GOB finally accepted the recommendation and declared the sixth hilsa sanctuary (S.R.O. No. 268-Law/2018) on September 13, 2018. The sanctuary covers 82 km at the confluence of the Meghna-Kalabadar-Gazaria rivers around Hizla-Mehendiganj Upazila in Barishal.	Conserving <i>jatka</i> increased fish production, especially among hilsa but also for river catfish and other coastal fish.
Allowable mesh-size to catch hilsa	ECOFISH conducted extensive research along the Meghna River and consulted with stakeholders. The project recommended 6.5 cm as the minimum allowable mesh size for hilsa gillnets. The GOB accepted the recommendation and has taken initiatives to change the rules related to mesh size.	Reduced <i>jatka</i> catch by ensuring the escape of undersized hilsa (less than 25 cm TL) and ensured sustainable increase of hilsa production enabling to catch right-sized hilsa.
Marine fishing restrictions (artisanal and industrial)	ECOFISH extended support to artisanal fishers and various fisher associations to cope with the marine fishing ban promoted in 2019 by the MOFL. The project raised its voice in different MOFL meetings and workshops to fine-tune the ban period covering the peak spawning season of marine fish as well as protection of <i>jatka</i> from huge midwater trawl catches during their downward migration into the ocean in early May.	Reduced overharvesting of coastal/marine fish catch and facilitate spawning and recruitment of coastal and marine fish leading to higher production. Marine hilsa landing also increased.
The Marine Fisheries Ordinance 1983 and its Amendments in 1986	The Marine Fisheries (Conservation and Development) Act 2018 has been placed as a bill to get approval as a new law. ECOFISH participated in reviewing the draft act, which will hopefully pass soon.	Assisted the GOB to formulate the act necessary for coastal and marine fisheries management.
The Nijhum Dwip Marine Reserve/marine protected area (MPA)	ECOFISH provided scientific evidence from 3 years of rigorous studies and delineated the boundary of the Nijhum Dwip MPA to the MOFL. Based on this recommendation, a government gazette in 2019 declared the establishment of the 3188 km ² for the Nijhum Dwip Marine Reserve/MPA.	Improved protection of hilsa migration route and improved conservation of hilsa, megafauna and shorebirds.

Table 5. ECOFISH’s policy influencing activities and their outcomes.



Plate 9. MOFL secretary Mr. Raisal Alam Mondal (third from left) presided over the stakeholder consultation workshop on establishing MPAs at the DOF premises in Dhaka.

Revising the Hilsa Fisheries Management Action Plan

The first version of the HFMAP was adopted in 2005 under the 4th Fisheries Project of the DOF. USAID/ECOFISH was then assigned to update this important policy document based on recent science-based information as well as co-management modalities necessary for sustainable management of hilsa. Incorporating all the information together, ECOFISH outsourced a team of experts that was deployed to incorporate all the project's best practices and revise the existing HFMAP. After the team did a thorough revision, ECOFISH submitted the revised version to the DOF for government approval.

Evaluations of economic valuation and impact of the compensation scheme of hilsa fisheries

The hilsa fishery is highly valuable to Bangladesh, but its true economic value is likely much higher than people think. Anecdotal evidence suggested that using economic incentives to manage the fishery has had positive social and ecological outcomes, but there had been no rigorous impact evaluation. ECOFISH engaged the IIED to conduct a study to identify the nonmarket (cultural, spiritual, historic) value of the fishery as well as to evaluate the impact of the compensation scheme to address both issues. The study revealed that the nonconsumptive value of hilsa is worth more than USD 355 million per year to the people of Bangladesh. Moreover, households were willing to pay proportionately more of their income to see an effective fishery management system put in place. This showed the government how

important it is to invest in a healthy hilsa fishery for long-term sustainability. These results sent a strong message to the government that investing in the successful management of the hilsa fishery not only makes sense from an environmental and economic point of view but is also vital to the social fabric of Bangladesh because the poorest will see the most benefits. The study findings were published in popular dailies.

Change in power dynamics in governing hilsa fisheries

ECOFISH analyzed the economic chain of the hilsa fishery to understand the vested interests, influence, power, and controlling relationships for developing strategies to support more equitable and conservation-friendly value chain interactions. The Power and Participation Research Centre (PPRC) and iDE helped ECOFISH complete a multilevel assessment. The IIED conducted a study, which ECOFISH outsourced, on power dynamics in the hilsa value chain under a different assignment. The results were published in an article in *Marine Policy*. The study showed that the top priority should be raising the voice of fishing communities and developing trust and confidence between government institutions to improve the lives of hilsa fishers. It also showed several key attributes of changing power dynamics in favor of poor fishers, such as establishing co-management bodies and providing interventions that could help fishing communities improve resilience. Another was increasing access of fisher households to appropriate financial services, including developing viable alternatives to *arotder* financing and also women's participation in AIGAs and savings schemes. Implemented project interventions included building co-management institutions and enhancing livelihood resilience under a framework of adaptive fisheries co-management for getting equitable benefits from the hilsa fishery.

The Hilsa Conservation and Development Fund and introducing PES

Various studies suggest that establishing a permanent financial structure for developing the hilsa fishery would be a better option than continuing long-term subsidies because it would ensure the economic emancipation of fishers. ECOFISH began developing the HCDF, a revolving

fund, as a legacy from an initial proposal for a “conservation trust fund” that the IIED proposed to sustainably manage hilsa fishstocks. ECOFISH created seed money by depositing an initial USD 500,000 after the MOFL formally approved the fund’s operational guidelines (Plate 10). This fund will contribute to the sustainable development of hilsa and promote the financial status of poor fisher communities. Co-management committees will be integrated into that system by undertaking initiatives, such as livelihood support for poor fishers and incentives for CFGs, within the scope of the work.



Plate 10. Dr. Malcolm Dickson, WorldFish country director, hands over a cheque to the director general of the DOF.



The fund has scope to expand further through assistance from the GOB and other development agencies and institutions. Theoretically, funds can be increased by adopting a [payment for ecosystem service \(PES\)](#) since hilsa has a market value over USD 3 billion (0.517 million tons @BDT500/kg). To find out its worth, the project reviewed the existing policy of investments for hilsa revival and development. It then explored pathways for distributing benefits (who pays and who gains) and developed policy recommendations for justifiable distribution through a sustainable PES intended for the welfare of fishers. The study showed that collecting BDT 1 (USD 1=BDT 84) per kilogram of landed hilsa fish could increase funds. This requires a legal institutional framework to collect funds and deposit them into the HCDF for resource users and managers.

Resilient fishing village: An approach of livelihood transformation

In 2017, two model resilient fishing villages were established: one in [Balaramsura, Bhola](#), and the other in [Uttar Bugola, Chandpur](#). These villages were intended to facilitate change in ecological, social, cultural and economic well-being. ECOFISH then made several investments in the following areas:

- good governance, such as strengthening the capacity of the co-management committees and Local Government Institutions
- infrastructure, including landing centers, roads and communications systems
- formal and informal social protection mechanisms
- basic service delivery, like health, education, sanitation and water
- livelihood diversification and sustainable management of the ecosystem.

The MOFL officially approved two upazila co-management committees (in Bhola Sadar and Haimchar, Chandpur) to supervise the progress of model village activities. The concept is appropriate for transforming [livelihoods](#) of fishing communities in a sustainable manner. Following this model, the World Bank financed the [Sustainable Coastal and Marine Fisheries Project](#) to upscale the concept to 100 coastal fishing villages.

Transboundary initiatives

Following previous initiatives of the Bay of Bengal Large Marine Ecosystem project, the IUCN, IIED

and the International Water Association, ECOFISH created a transboundary platform for hilsa development and conservation. As Bangladesh, India and Myanmar share a common resource in the Bay of Bengal, and together they make up more than 98% of global hilsa production. The IIED's Darwin Initiative project and ECOFISH jointly organized a [transboundary hilsa fishery workshop](#) in Dhaka jointly to share knowledge and lessons learned with a visiting team from Myanmar. The workshop ended with a decision to move toward cost-effective and scientifically researched sustainable hilsa management for Bangladesh and Myanmar by establishing a dialogue on a future [transboundary management system](#). This will pave the way to expand this effort with both India and Myanmar.

Promoting small-scale fisheries guidelines

In June 2019, ECOFISH organized a national [symposium on small-scale fisheries \(SSFs\)](#) in Dhaka. The event aimed at sharing knowledge on improved governance to manage SSFs in Bangladesh (Plate 9). The symposium helped raise public awareness and political will for implementing the Food and Agriculture Organization's Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries. It also stimulated collective research and policy agendas toward the sustainability of SSFs and achieving UN Sustainable Development Goals (SDGs) in Bangladesh. That same year, WorldFish also sent ECOFISH team members to attend a multistakeholder information and communication workshop called [Small-scale fisheries, food security and wholesome nutrition: Understanding, appreciating and interrogating the linkages](#). Held in Penang, Malaysia, it helped to build capacity on implementing guidelines for SSFs.



Plate 11. Participants at the Small-Scale Fisheries Symposium 2019.

Alternative tenure arrangements in the Meghna River

Tenure and clear boundaries are critical enabling elements for co-management of fisheries. In 2016, the project conducted a study to assess the possibilities of creating tenure arrangements in portions of the Meghna River system. This was done with help from the USAID-funded Tenure and Global Climate Change program, and the resulting report was called [Marine Tenure and Small-Scale Fisheries: Learning from the Bangladesh Experience and Recommendations for the Hilsa Fishery](#). Later on, ECOFISH organized a stakeholders dialogue, where recommendations were made to design interventions in the project's next implementation year.

Developing a framework for the Ecosystem Approach to Fisheries Management

ECOFISH carried out EAFM planning and implementation processes. Using co-management as a vehicle, the project identified fisheries management areas (sanctuaries, MPA sites) in partnership with local co-management committees, other national government agencies, fishers, civil society organizations, the private sector, universities and other stakeholders. For this, existing policies, laws and jurisdictions related to the ecosystem approach to fisheries management were then reviewed. With the help of two expat trainers from the Philippines, the project organized two batches for training of trainers on EAFM. Among the 65 participants who received advanced training as EAFM Champions (master trainers) were DOF officials, BFRI scientists, university teachers, development practitioners and WorldFish staff. A rigorous training manual was prepared, both in English and Bangla, and then submitted to the DOF for gradually implementing the EAFM to manage capture fisheries in the country.



Photo credit: Mohammad Mahabubur Rahman/WorldFish

Meghna River, Bangladesh. Mohammad Mahabubur Rahman.

Interventions in zone of resilience

With the recent influx of Rohingya refugees from Myanmar and the impacts on local communities and natural resources, ECOFISH's interventions have been extended to the ZOR in Cox's Bazar, focusing on Ukhiya-Teknaf peninsula. The host fishing communities of the Naf River have become especially vulnerable as the GOB imposed a fishing ban in the river in September 2017 for an unlimited period to curb smuggling from Myanmar. To ease impacts on the host fishing communities in the ZOR, ECOFISH came forward with interventions through different activities. The overall goal of the interventions was to strengthen the ecosystem resilience of the Naf River and adjacent marine habitats and improve the well-being of the host fishing communities in the ZOR. A team from ECOFISH, WorldFish and the DOF, along with partners from Shushilan, implemented the activities. Before beginning the interventions, the project assessed all biophysical characteristics

of the ecosystem as well as biodiversity and threats to biodiversity.

The project provided livelihood support to meet the immediate needs of 1049 households in 30 fishing villages. Support covered vegetable gardening as well as poultry and livestock rearing to improve income and nutrition among households. It also supported small businesses as an alternative livelihood option, promoted seaweed and green mussel farming as an environment friendly AIGA, provided all sorts of support for practice crab fattening to earn quick profits, and facilitated production of safe and quality dried fish. Over 9 months, ending on December 31, 2019, the intervention brought about a harmonious and peaceful condition in about 30 fishing villages, 16 of which were considered extremely vulnerable.



Crosscutting dimensions

i. Communication and sharing knowledge

ECOFISH played an important role in effective communication with the targeted audience. The project used several methods to share information with the people who have an active influence over the fishing communities:

- telling stories of change through traditional communication media
- using digital tools to send outputs to policymakers
- emphasizing efforts through web-based publications and social media campaigns
- engaging in conversations that inspire fishing communities
- working together with different stakeholders and relevant institutes to properly publicize conservation of hilsa and other endangered coastal fisheries.

Through all these methods of communication, ECOFISH upheld the project's identity following USAID's reputation to fulfill its mission and vision.

Project launch event 2015

In 2015, ECOFISH was formally **launched** at the Hotel Sonargaon. In attendance were the minister of the MOFL and the US ambassador to Bangladesh. The main objective was to present the planned project activities from top- to bottom-level stakeholders (Plate 12).⁶



Plate 12. Dignitaries, including the US ambassador to Bangladesh and the minister of the MOFL, attend the ECOFISH launch event.

Participation in the annual National Jatka Conservation Week

As a part of a national campaign stop catching *jatka*, the GOB began observing the annual National Jatka Conservation Week in 2015. ECOFISH has participated in this event every year with conservation messages and valuable information for beneficiaries and the general public. The project participated in *jatka* week rallies, boat proceedings, discussion meetings and awareness raising activities at all of its working stations. ECOFISH has produced **leaflets**, **posters**, **festoons**, **banners**, **blogs** and social media posts and actively participated in different programs over the week.

Participation in National Fish Week activities

The National Fish Week campaign is usually observed sometime between July and September every year to boost fish production and resource conservation. ECOFISH and WorldFish have taken part in this national event every year since 2015. Project officials have participated in rallies, meetings, awareness activities and also in the National Fish Fair by setting up stalls in different regions, including the Central Fish Fair in the capital (Plate 13). ECOFISH has highlighted conservation messages to visitors. through many communication tools and methods.



Plate 13. MOFL secretary and DOF officials visit ECOFISH's stall at the National Fish Fair in 2018.

The Hilsa Breeding Festival

The idea for the Hilsa Breeding Festival was first developed by ECOFISH under guidance from the project's team leader and through close observation from USAID. The festival used to be held during the brood hilsa ban period to make fishers and other stakeholders aware of brood hilsa conservation. At this annual event, ECOFISH arranged different types of games and cultural activities for fishing communities in the coastal areas (Plate 14). The first Hilsa Breeding Festival was held on October 22, 2016, at Kuakata in Patuakhali. Two years later, the event was held in Hizla and Mehendiganj upazilas of Barishal District near the bank of the newly declared sixth hilsa sanctuary. At every event, all stakeholders, including high officials from the GOB, USAID and WorldFish, have actively participated and enjoyed the cultural programs.



Plate 14. Local students perform a stage show during the first Hilsa Breeding Festival, in 2016.

Fisher Women Congress

The FWC is another unique ECOFISH program. Not only is the platform new to Bangladesh but also to Asia. In this initiative, fisherwomen associated with co-management activities focusing on CSGs and HCGs are the main participants and performers. ECOFISH helped organize the event in Bhola, Barishal and Chandpur in 2016, 2017 and 2019, respectively (Plate 15). It has become a strong platform for empowering women and encouraging them to play an appreciable role in natural resource management and community decision-making.

Roundtable discussion with the *Prothom Alo*

After bumper hilsa production in 2016 and 2017, ECOFISH initiated a national dialogue with the GOB, NGOs, policymakers, scientists and



Plate 15. Women from fishing villages participated in the first FWC and become "conservation champions" in their communities.

Box 3. Social media campaign against *panta-ilish*

In recent years, people in urban areas of Bangladesh had started eating *panta-ilish* (water-soaked rice and hilsa) on the *Pohela Boishakh*, the first day of Bengali New Year. This new trend had no connection to the country's long tradition of celebrating the day. The Bengali New Year falls in the middle of April, when sanctuaries are closed (March–April) to save *jatka* (juvenile hilsa) and broods of other fish. During this period, the demand and price for hilsa become exceptionally high, which lures fishers into breaking the law to catch hilsa and *jatka*. Immediately after its inception in 2015, ECOFISH began producing communication materials in an attempt to stop this trend. The project produced a rhyming message on banners and festoons against *panta-ilish* to reach into the hearts of the participants. In 2016, it created a Facebook page called Conserve Hilsa that reached over 4000 subscribers. ECOFISH also started a program called *Vow to celebrate Pohela Boishakh without Hilsa* through various social media channels, reaching 217,000 people. The campaign attracted attention from all levels, including government and policymakers, and even drew support from the country's prime minister.

scholars along with representatives from fishing communities. ECOFISH and the DOF organized a roundtable discussion in partnership with *The Daily Prothom Alo*, the country's most influential and widely circulated daily newspaper. Together, they discussed [how to increase hilsa production while making it sustainable](#).

Digital publications

The following is a list of ECOFISH success stories, photos, videos and public service announcements (PSAs) that were published in a variety of ways using several platforms:

- *Changes Can Happen through Alternative Livelihood Options* (submitted to USAID): This is a success story about Puloma Rani and her family. Rani, who comes from the remote village of Hossainpur of Kalapara, Patuakhali, in the southern part of Bangladesh, was given quality seed and received training from ECOFISH to improve her livelihood.
- *Shopna's story* (published on pebblechild.com)
- *Invisible fisher women of Bangladesh raise their voice* (published on WorldFish's Fish Tank blog)
- *Invisible fisher women of Bangladesh* (published on a newspaper blog)
- *Putul Rani inspires community to conserve hilsa in Bangladesh and Boosting hilsa production and improving fisher livelihoods in Bangladesh* (ECOFISH interactive web stories)
- *Hilsa – life & livelihood, ECOFISH project brief, Fisher Women Congress (FWC)* (ECOFISH photo stories)
- *ECOFISH^{BD}: Conserving Bangladesh's national fish* (ECOFISH promo). This project promo was highly praised by USAID and GOB officials. USAID showed this promo on many occasions as an excellent example of digital storytelling.
- *Conserving hilsa and building livelihoods in Bangladesh, Fishers join together to save hilsa, national fish of Bangladesh, Women led conservation* (ECOFISH videos): These videos played on national television and received high praise.
- *Let Jatka fish grow, our golden days will return* (ECOFISH PSA): This PSA was also well received.

Publications

ECOFISH also published a number of articles on hilsa conservation, fisheries management, AIGAs and behavior change communication (BCC).

A fact sheet was published in 2015 describing objectives, goals, expected results and other relevant information about the project. As a part of its BCC activities, ECOFISH published leaflets, fliers and posters every year regularly during occasions like the FWC, National Fish Week, National Jatka Week, Hilsa Breeding Festival and the brood hilsa ban period (Plate 16). Other published materials included the HFMAP (short version), Fishers Women Savings Management Guidelines, Farmer's Guidebook on Pond Fish Culture and the Business Literacy Book for CSG members.



Plate 16. A Bengali leaflet published during the hilsa brood ban period (left and middle) and a cover of the Business Literacy Book for CSG members (right).

Billboards

ECOFISH installed more than 72 billboards, at different strategic locations in project areas, focusing on *jatka*, brood hilsa and megafauna. The billboards carry messages urging fishing communities to refrain from catching megafauna, release unintentionally caught megafauna, stop using illegal gear, keep beaches clean, protect the marine environment, and avoid polluting rivers from industrial polluters, sewage and plastics.

Social media campaign

ECOFISH launched a "Conserve Hilsa" social media page on Facebook to amplify the BCC campaign. So far, about 264 blogs, photos and video stories of ECOFISH activities on hilsa conservation have been posted. The page had 4300 organic subscribers, including people from fishing communities as well as the research and education sectors. The page has created significant public attention several times on different occasions and at events organized by the GOB, USAID and WorldFish. It is now one of the dominant social media platforms in the fisheries sector.

Branding and marking

ECOFISH ensured branding and marking in its communication products and conducted programs and events during the project. These were done according to mutually agreed upon branding guidelines with USAID, WorldFish and the DOF, and always highlighted USAID's mission and vision. ECOFISH branding was maintained at all major events, including the National Fish Fair rally, Jatka Week rally, Jatka Week boat procession, Fish Fair stall installation, HFMAP workshop, the project's inauguration program, resilience model village inauguration programs, stakeholder consultation meetings, planning meetings, the FWCs and the Hilsa Breeding Festival.

News coverage in printing and electronic media

ECOFISH received media attention from its very beginning during its successful journey toward conservation. A large number of journalists and media members showed interested in news and views of project activities, and many lead stories and op-eds were published in the country's renowned daily, weekly and fortnightly publications. These were based on ECOFISH's scientific research, co-management approach, CFGs, alternative livelihood programs, value added hilsa products, the new hilsa sanctuary, and newly declared MPAs. Success stories were broadcast on several different TV channels. For example, Channel-I broadcasted the inauguration program in 2015, while BTV televised the Hilsa Breeding Festival in 2017 as well as model resilient village inauguration programs in both 2018 and 2019. Local newspapers also published news and views on ECOFISH's local interventions and successes on many occasions.

Infographics

ECOFISH used infographics in many of its print and digital productions. The first in-house video production was an infographic presentation for a hilsa promotion. Another video, *Conserving hilsa and building livelihoods in Bangladesh*, showed the spawning season and migratory route of hilsa. In many project outputs, ECOFISH also prepared a catchy infographic using the shape of hilsa to understand IRs.

Celebrating World Ocean Day

In 2018, ECOFISH celebrated World Ocean Day by holding different events across all the project's field locations in Bangladesh. Awareness raising programs were organized at all working stations focusing on the event's theme: Preventing Plastic Pollution and Encouraging Solutions for a Healthy Ocean. Local wholesalers, fishers and people from local communities attended the event, and awareness-based leaflets were distributed among the people from different stakeholders in the program.

Drama and cultural event

Using drama and cultural programs, ECOFISH publicized messages to its targeted audience through onstage skits, dances and songs (Plate 17) focusing on hilsa conservation. They also depicted the conservation rules for fishers and helped them understand the benefits. *Sabure Ilish fole* was an interactive drama staged at the BRAC center in Barishal, while *Motsho raj ilish* was staged in Kuakata and Mehendiganj during the Hilsa Breeding Festival. ECOFISH scripted, directed and organized these performances, which were performed by local school students, some of whom were from fisher families.



Plate 17. A parody staged during the ECOFISH launch.

Celebrating World Wildlife Day

On March 3, 2019, ECOFISH celebrated World Wildlife Day at its various stations. The day was observed with different activities that included a rally, student participation to clean the riverbank and meetings with fisher communities to help them understand the benefits of conservation. The project also observed a daylong program at the Bangladesh Fisheries

Development Corporation (BFDC) fish landing station in Cox's Bazar (Plate 18). The theme for World Wildlife Day was “Life below Water: for People and Planet.” The event was organized in collaboration with the WCS, DOF and BFDC on ocean wildlife that reflected the year’s theme.



Plate 18. USAID/ECOFISH observe the 2019 World Wildlife Day in Cox's Bazar.

ii. Gender integration in fisheries management

The combination of gender equity and women’s empowerment was an important component for ECOFISH. To increase resilience and social cohesion, the project addressed gender mainstreaming in all of its activities and made women’s involvement in income generation and leadership a key focus. The belief was that this would play a positive role in natural resource management and reduce gender-discriminatory norms and practices that negatively affect women’s lives and livelihoods. The project created links to both services and markets and made sure to involve both women and men in all spheres of co-management. It also incorporated gender in every policy aspect of hilsa fisheries management and biodiversity conservation. An inclusive women empowering innovative approach was the key element of ECOFISH’s gender strategy (see page 71 for more details). CSGs for fisherwomen and

the participation of women in all tiers of fisheries management are the best examples of gender integration through the project.

iii. Social and technical innovations

One article on hilsa genetics has already been published in a nature group journal called *Scientific Reports*. This resolved long-term scientific disputes about hilsa subpopulations and their spawning migration back to their natal rivers. Using boat skippers as citizen scientists, innovative approaches to generate fisheries data through smartphones are being used to provide reliable data on catch monitoring and stock assessment. Fisheries co-management approaches and livelihood improvements have shown great success in the revival of hilsa. With hilsa being an anadromous migratory fish in the open water riverine environment of Bangladesh, this attempt to implement adaptive co-management is unique in its scale and nature and deserves scaling for similar fish elsewhere. Fisherwomen-led CSGs are another significant social innovation that has improved the adaptive and transformative resilience capacities of the fishing households within the social system. They have also reduced the dependence of these households on their age-old loan shark, *dadonder*.

iv. Environment and climate change

The Environmental Monitoring and Mitigation Plan (EMMP) is one of the major compliance requirements for USAID-funded activities. The EMMP provides a basis for systematically implementing an initial environmental examination and an environmental impact assessment of aquatic ecosystems. The plan’s purpose is to determine whether the proposed project interventions have any potential adverse impacts on the environment as well as to suggest a mitigation plan to reduce any environmental consequences.

ECOFISH followed the EMMP at every level of its interventions. The project strengthened the resilience and adaptive capacity to climate change by supporting sustainable and climate-resilient fisheries, AIGAs, gender equality and increasing social capital in fishing communities. In all of its interventions, ECOFISH always followed the USAID’s EMMP guidelines.

v. Capacity building

Capacity building was an important crosscutting theme of the project, and events related to capacity building events (Table 6) played a crucial role in bringing about positive changes in knowledge, skills and attitudes. Local capacity development was a continuous effort of the project, as ECOFISH strengthened the capacity of the HCGs, CSGs, HGGs, CFGs and FMCs in various aspects.

For learning about HCGs, the project followed a 3-year plan consisting of 24 sessions (6 sessions in the first year, 12 in the second and 6 in the third). This covered four major areas: (1) group management, (2) natural resource management (3) co-management, and (4) livelihood and social development. In addition, HCG household members were taught technical and business matters in AIGA training. This helped them undertake appropriate AIGAs and enhanced their problem-solving abilities.

Providing business skills to CSG members through BLSs was another important capacity building initiative of the project. ECOFISH organized training of trainers on the EAFM to develop the national capacity for planning and implementing the plan to sustain the country's capture fishery (Table 6 and Plate 19). Likewise, the project also organized several capacity building activities, such as training

sessions, meetings, workshops and discussions. These were held not only for hilsa fishers but also for different types of stakeholders, including academics, fisher leaders, co-management practitioners, government officials, law enforcement officers, women's group leaders, NGO partners and WorldFish staff (Table 6 and Annex 5).

On top of all this, ECOFISH held overseas training sessions, exposure trips and conferences related to natural resource management for 74 government officials representing the MOFL, DOF, BFRI and the Planning Commission, as well as staff from WorldFish and its NGO partners. Three postgraduate scholarships (MS-2 and PhD-1) were also offered for capacity building of three BFRI scientists at the University Putra Malaysia.



Plate 19. Government officials, fishery managers, academics and practitioners receiving the EAFM training of trainers.



Fishing trawler, Bangladesh.

Topic	Event (#)	Women (#)	Men (#)	Total (#)
AIIGA training for fishing households				
Bamboo craft manufacturing	1	15	0	15
Poultry rearing and homestead vegetable production	12	353	4	357
Commercial and homestead vegetable production	10	173	75	248
Cattle rearing and homestead vegetable production	5	130	20	150
Duck rearing and homestead vegetable production	15	329	112	441
Goat rearing and homestead vegetable production	322	5895	4120	10015
Improved cooking stoves, retained heat cookers and business development	2	40	0	40
Improved paper bag making	1	5	0	5
Fishpond culture and homestead vegetable production	46	326	869	1195
Cage fish culture	2	42	17	59
Tailoring business	3	56	0	56
Making briquettes as alternative cooking fuel	1	10	0	10
Appropriate alternative livelihood opportunities	5	105	56	161
Marine coastal seaweed and green mussel cultivation	2	12	18	30
Safe dried fish production: processing, storage and marketing	6	39	141	180
Subtotal	433	7530	5432	12962
Capacity building training for fishing households and groups				
Ecofriendly fishing	19	216	265	481
Operation and management of women-led CSGs	41	720	123	843
Leadership development for FMC leaders	29	138	400	538
Leadership development and institutional capacity building	59	477	693	1170
Co-management of hilsa sanctuaries	6	11	35	46
CFGs for participatory surveillance of hilsa sanctuaries	14	0	400	400
Group management	2	48	0	48
Subtotal	170	1610	1916	3526
Training ECOFISH staff, academics, NGO staff, GOB officials and practitioners				
Mainstreaming EAFM in Bangladesh	1	9	28	37
EAFM	2	13	40	63
ECOFISH implementation modality	1	5	39	44
Mobile application-based monitoring system	2	2	29	31
Basic monitoring and evaluation, and database orientation	2	6	29	35
Business literacy development	6	84	67	151
Orientation on community profiling	3	9	59	68
HCG learning session facilitation and stakeholder engagement	2	7	46	53
Agro-based AIGAs for partner NGO staff	1	0	4	4
Subtotal	20	135	351	486
Total	623	9275	7699	16,974

Table 6. ECOFISH training sessions.

Project performance: monitoring, evaluation and learning

A result-based monitoring system was used to track results against 12 predefined indicators: 5 were USAID standard indicators and the remaining 7 were custom indicators. The data for the indicators was collected through monthly, quarterly and annual performance surveys. Four annual performance surveys were held during the project period supplemented by periodic complementary surveys. Data quality assurance was embedded in all surveys following USAID's Data Quality Assessment standard. The monitoring, evaluation and learning (MEL) unit analyzed the data and helped draft the quarterly and annual reports on the project's progress considering the reporting requirements of USAID and WorldFish. ECOFISH developed a resilience impact evaluation framework based on a quasi-experimental design applied to a difference-in-difference protocol. The project employed

a random sampling technique and selected a minimum of 1200 respondents from sanctuary and nonsanctuary areas for performing baseline and end-line surveys (panel data). GIS tools were used to help the project team select the strategic fishing villages and fish landing centers along the hilsa sanctuaries using Google Earth.

“ *There was an accelerated increase in hilsa fishstocks in 2016 and 2017, and sufficient evidence exists to attribute that recent increase, at least in part, to specific ECOFISH interventions. There is equally strong evidence of an increase in the incomes of beneficiary poor fisher communities, primarily as a consequence of community-level ECOFISH interventions.*

– **ECOFISH Mid Term Performance Evaluation** ”



Hilsa conservation group, Bangladesh.

Summary of results: USAID and ECOFISH indicators

The project contributed to achieving predefined USAID standard and ECOFISH custom indicators (Table 8) as a result of assistance from the United States Government (USG).

EG.10.2-2: Number of hectares of biological significance and/or natural resources under improved NRM as a result of USG assistance

The project covered a total of 369,159 ha of biologically significant areas by establishing and strengthening co-management efforts in its entire TOO. This covered the following hilsa sanctuary areas:

- 186,050 ha in the Lower Meghna River in Bhola, Chandpur and Laxmipur
- 89,358 ha of the newly declared MR/MPA in and around the Nijhum Dwip areas
- 59,151 ha comprising the Tentulia River in Bhola and Patuakhali and the Padma River in Shariatpur District
- 31,800 ha of newly declared Hizla-Mehendiganj sanctuary in Barishal District
- 2800 ha of the Andharmanik River

EG.10.2-3: Number of people with increased economic benefits derived from sustainable NRM and conservation as a result of USG assistance

The project targeted 100,000 household members (50% of whom were women) with increased economic benefits. ECOFISH managed to secure economic benefits for 90,510 household members (44% of whom were women) through different livelihood interventions and increased fish production in the coastal rivers. Systematic data showed a 65% increase in income among targeted beneficiaries against the baseline (Table 7).

EG.10.2-4: Number of people trained in sustainable natural resources management and/or biodiversity conservation supported by USG assistance

ECOFISH's capacity building efforts trained members of village-level HCGs. Over its duration, the project trained 18,528 people (39% of whom were women) and attained 93% achievement against the target.

EG 10.2-5: Number of laws, policies, strategies, plans, agreements or regulations addressing climate change (mitigation or adaptation) and/or biodiversity conservation officially proposed or adopted as a result of USG assistance

ECOFISH generated science-based information to help policymakers at various levels adopt fisher-friendly policies, laws and regulations through the IR4 component of the project (Table 8).

EG 11.2: Number of institutions with improved capacity to address climate change issues as a result of USG assistance

ECOFISH measured the institutional capacity of 575 informal co-management institutions (HCGs) to address climate change. HCG capacity assessment covered five areas: (1) governance constitutional processes and legal status, (2) dynamism, (3) organizational management, (4) development activities and (5) climate change. All HCGs improved their institutional capacity: 66% ranked "very strong," 24% "moderately strong" and the remaining 10% "moderately weak."

Source	End line (n=1217)		Baseline (n=1217)		Change (BDT/hh)	Change (%)
	Amount (BDT/hh)	% of income	Amount (BDT /hh)	% of income		
Fishing income	108,175	77	64,913	76	43,262	67
On-farm income	16,124	11	7479	9	8645	116
Non-farm income	16,295	12	12,644	15	3651	29
Total income	140,594	100	85,036	100	55,558	65

Table 7. Average income per fisher household (hh) from fishing and other sources (1 USD = BDT 84).

Indicator Number	Indicator title	Target	Accomplished (%)
EG.10.2-2	Number of hectares of biological significance and/or natural resources under improved natural resource management as a result of USG assistance	375,158	98
EG.10.2-3	Number of people with increased economic benefits derived from sustainable NRM and conservation as a result of USG assistance	100,000	91
EG.10.2-4	Number of people trained in sustainable natural resources management and/or biodiversity conservation supported by USG assistance	20,000	93
EG.10.2-5	Number of laws, policies, strategies, plans or regulations addressing climate change (mitigation or adaptation) and/or biodiversity conservation officially proposed or adopted as a result of USG assistance	5	100
EG.11.2	Number of institutions with improved capacity to address climate change issues as a result of USG assistance	575	99
ECOFISH - Custom	Number of improved decision-making science documents produced supported by USG assistance	6	133
ECOFISH - Custom	Percent increase in hilsa abundance in the sanctuary areas supported by USG assistance	10	110
ECOFISH - Custom	Number of clauses supported by science included in the modification of hilsa management plans supported by USG assistance	10	110
ECOFISH - Custom	Number of training hours in natural resources management and/or biodiversity conservation supported by USG assistance	140,950	143
ECOFISH - Custom	Number of women benefiting from access to finance and savings in community savings and loan programs	4500	92
ECOFISH - Custom	Number of women and men from fishing households who have received training on alternative livelihoods as a result of USG assistance	14,000	93
ECOFISH - Custom	Number of households with improved well-being and diversified sources of income as a result of USG assistance	20,000	94

Table 8. ECOFISH achievements according to USAID standard and ECOFISH custom indicators.

Impacts, sustainability and lessons learned

ECOFISH impacts

Total hilsa production increased

Total annual hilsa production declined sharply in 2002–2003. After 2005, however, as a result of implementing the HFMAP, the hilsa fishery was revived and production increased 5% per year until 2015 (Figure 8). At the start of the project, ECOFISH began implementing general management activities, including science-based co-management, community mobilization with its spillover effects, adopting a coherent awareness-building approach, and livelihood interventions. The synergistic impact of these efforts improved the hilsa fishery. The average annual incremental total hilsa catch increased from 5% to 9.2%, which resulted in a total catch of 530,000 t in 2019. This was little bit higher than the MSY estimated in 2016 (526,000 t) though lower than the 2019 estimate (690,000 t). Inland catch showed a higher average increment (18%) than that of the marine catch (4.5%).

Over ECOFISH's 4-year project period, total catch increased 14% (inland 30%, marine 5.4%) in the first 2 years (2016–2017) and then slowed down

to 3.4% (inland 3.6%, marine 3.2%) in the final 2 years (2018–2019) as it approached the MSY (Figure 8). Anecdotal evidence suggests that hilsa has returned to all upstream rivers, and was even found migrating all the way to Allahabad, India, after 40 years. Hilsa were caught abundantly in coastal rivers during the off-season as well. These extra benefits improved the livelihoods of fishers and traders⁷ and raised the nutrition of consumers. Now, it is essential to keep the momentum going until the increased production reaches the carrying capacity of the ecosystem.

Size of hilsa

As shown in Figure 9, individual hilsa increased in weight from an average of 510 g in 2014 to 915 g in 2019 (with 20% exceeding the benchmark) and this resulted in a significant shift in the size group compositions from smaller to larger. In 2019, the proportion of large hilsa (20%) exceeded small hilsa. This gradual shift from groups of smaller hilsa to larger ones indicated better fisheries.

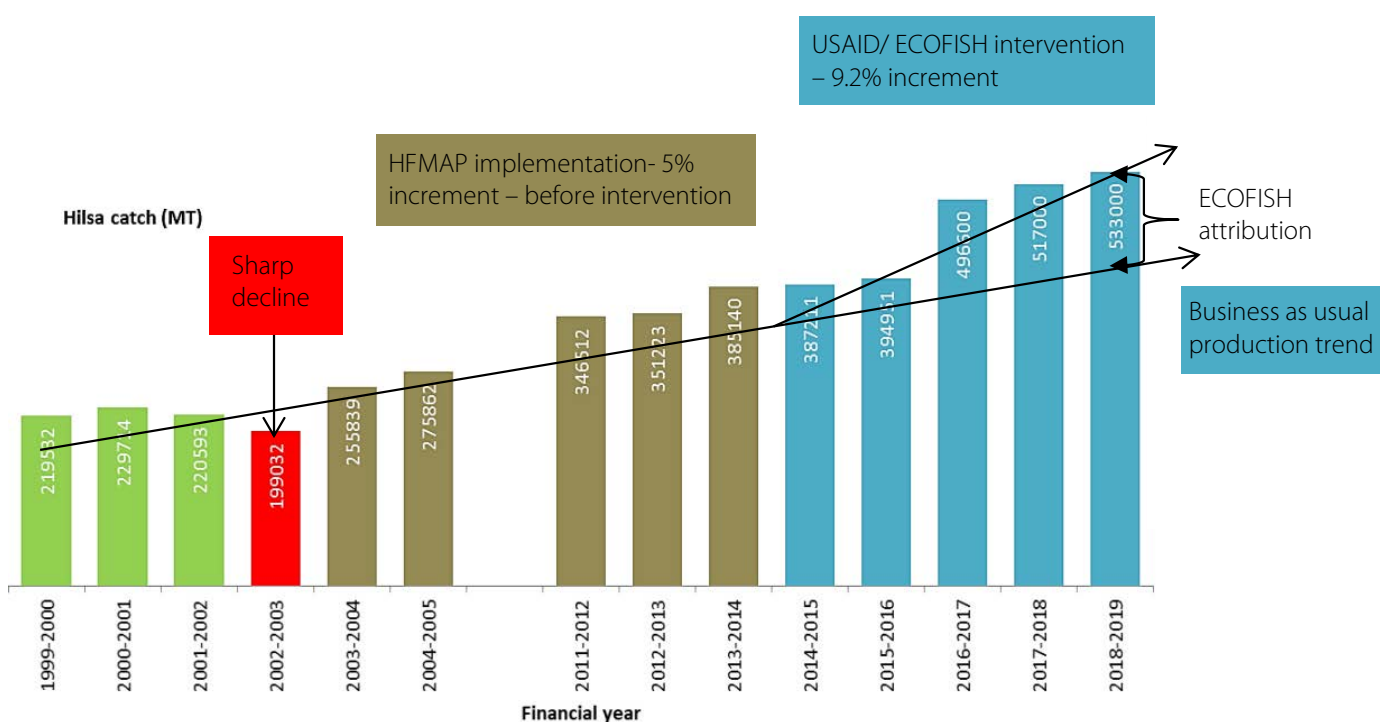


Figure 8. Annual hilsa production trends before and after co-management interventions.

Catfish abundance and fish biodiversity improved

As a result of better hilsa management, there has also been an increase in the number of *pangas*, a large river catfish. In 2016 (baseline), the average daily catfish catch from hilsa nets was about 1 kg per boat. During the end-line survey in 2019, the average catch had increased to 1.5 kg. There are two possible reasons for this increase: first, increased *jatka* production provided more food for catfish; second, protecting hilsa brood and juveniles had the added benefit of conserving catfish brood and juveniles as well.

Household income

On top of the increase in hilsa and catfish production, there were also accompanying increases in on-farm and non-farm AIGAs as

well as income from fishing activities and total household income during the 4 years (2016–2019) of the ECOFISH project (Figure 10). These increases will lead to improved livelihoods for the fishing communities.

Women’s access to finance

As a part of improving livelihood resilience, especially access to finance for women, ECOFISH’s formed 148 CSGs. Together, these groups saved USD 159,000, and their collective savings continue to grow. From this fund, about 3950 women received credit to start small businesses. It also increased women’s access to funding, power in decision-making improved, control over resources strengthened and participation in income generating activities.

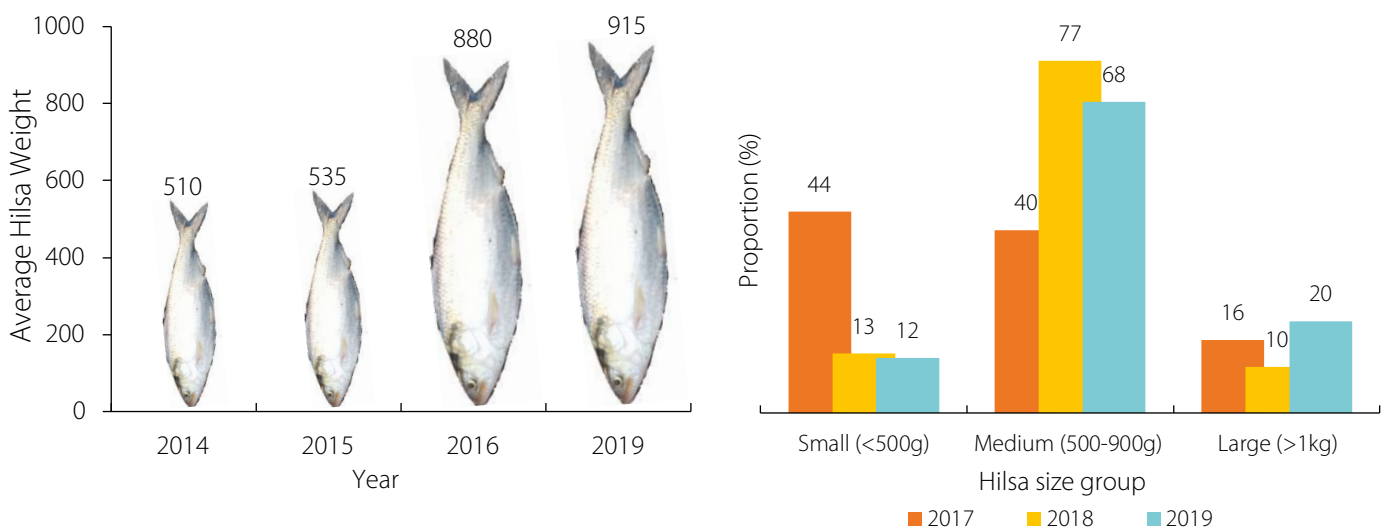


Figure 9. Increase in average weight of hilsa (left) and size compositions (right).

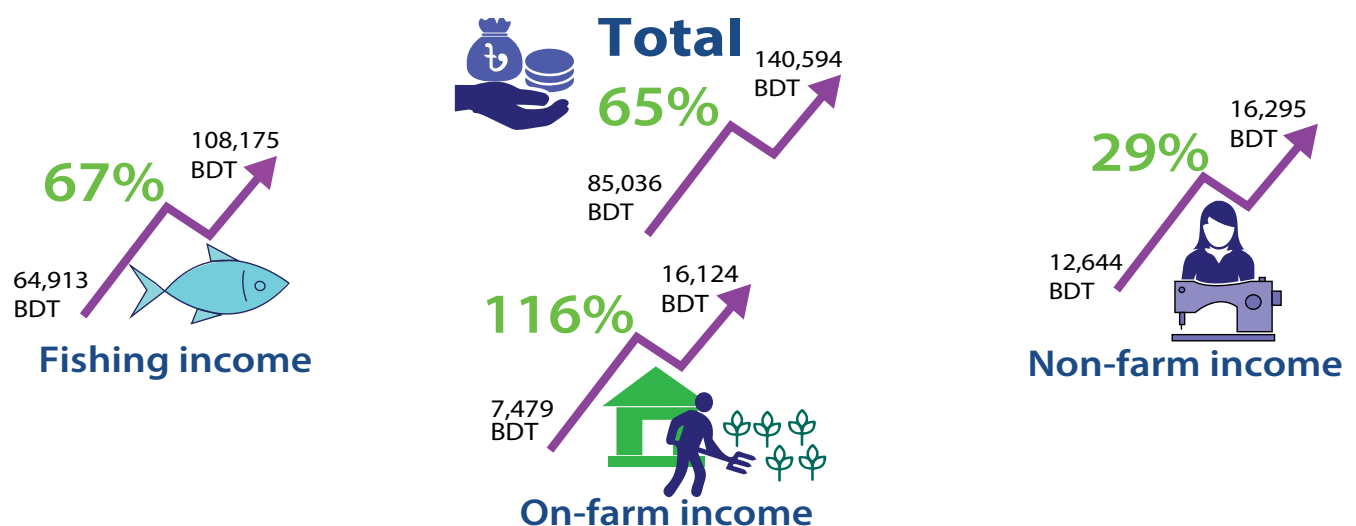


Figure 10. Income increases as a result of ECOFISH activities.

Behavior change in biodiversity conservation

ECOFISH's communication approach (p-model) played an important role in changing attitudes toward observing ban periods and using legal gear, and this will eventually contribute to conserving biodiversity and the ecosystem. The project determined that changes in awareness, knowledge and attitudes were places where behavior change strategies could have an important impact on conserving biodiversity. The village-level HCG graduation model provided ways to educate grassroots fishermen about destructive fishing methods. It proved successful in changing behavior that ultimately enables stakeholders to build upper-level co-management institutions. The immediate benefits of the model produced zero violations in the project villages during fishing closures. As a result, increasing community engagement reduced the threats to biodiversity in the co-management areas of the sanctuaries.

Afterward, ECOFISH provided training on biodiversity conservation benefits as well as a popular type of economic incentive through livelihood benefits. The project focused on organizing innovative events involving the wider fishing communities. These events included the FWC, the Hilsa Breeding Festival, community participation in guarding the sanctuaries, and preparing advanced communication materials targeted toward desired changes in attitudes and behavior at the household level.

Fisheries governance improved

One of the most important efforts of the ECOFISH project was to reverse the top-down style of governance for the hilsa fishery. The traditional *dadon* system was an exploitative moneylending practice in which fishers were forced into selling harvested fish through the moneylenders and also had to pay them commission. ECOFISH's new bottom-up approach focused on landing centers (*ghat*) as the main hub of the system. In this respect, it would be helpful if co-management involved all stakeholders and focused on HGGs as well as alternative financing from CSGs and the HCDF. Overall, several positive changes were made through the project interventions: participatory governance was adopted by increased consultation in decision-making, capacity was improved in local-level planning, voices were raised, changes were

made in power distribution, participation and capacity of women were strengthened, and institutional capacity was increased.

Food security improved

The ECOFISH study indicates that the three well-being indicators—household dietary diversity score (HDDS), household food insecurity access scale (HFIAS) and food consumption score (FCS)—all evolved in the expected direction after project interventions. Fish consumption almost doubled, so both HDDS and FCS increased while the HFIAS decreased twofold. The evidence also showed that the HDDS and FCS of the treatment groups were higher at the end-line than those of the control groups, while the treatment group's HFIAS was lower than that of the control group.

Improved community resilience

ECOFISH worked with individuals, households and communities across interconnected social, ecological and economic systems to strengthen the resilience of the local fishing communities affected by recurrent crises. The project provided support to build resilience capacities that enabled them to take on better coping strategies. Analyzing the project's impact pathways revealed that ECOFISH households had a higher propensity to adopt adaptive or transformative responses than nonbeneficiaries when hit by a shock. Beneficiaries also reported a higher recovery rate than households in the control group.

Scaling out the hilsa conservation model

The success of the hilsa management in Bangladesh attracted the attention of two neighboring countries. Taking lessons from Bangladesh, both India and Myanmar adopted incentive-based management as well. India has taken initiatives to conserve juvenile and brood. West Bengal, specifically, has subsequently amended its respective inland and marine fisheries laws to implement a ban on hilsa fishing during the spawning and breeding seasons. India and Bangladesh are also working toward improving the lives and livelihoods of communities dependent on hilsa. As for Myanmar, ECOFISH shared lessons learned from its hilsa conservation and management model, which [develops](#) a cost-effective, scientifically researched and participatory incentive-based fisheries management.

Sustainability and exit routes

ECOFISH ensured the sustainability and proper use of information, technology and data generated from the project activities. Most of the information has been used to update the HFMAP that will be used as a guideline for hilsa management over the next 10 years. A database on crafts and gear in the upazila of Bhola Sadar has been handed over to the DOF, while production technology to make soup and noodles made from hilsa have already been handed over to a private entrepreneur. The DOF could scale up the citizen science-based catch monitoring system through the SCMF project.

Information regarding other aspects of the hilsa fishery have also been used and will remain in use on a long-term basis. These include optimizing the 22-day brood hilsa ban period, determining the allowable mesh size for hilsa gillnets, the maximum sustainable yield for hilsa, delineating the Nijhum Dwip MPA and formulating the adaptive co-management in the riverine ecosystem. The impacts of these uses will benefit hilsa and other coastal fisheries for sustainable management purposes. Institutionalizing co-management or integrating it into the DOF could sustain the impacts even further. This would provide space to focus on important components of the fishery, such as the FMC, upazila co-management committees (UCCs), DCCs, CFGs and CSGs. The DOF could scale it up to 100 more villages through the SCMF project. Expanding the scope of ECOFISH's HCDF might help secure continued funding for the sustainable management of hilsa and other coastal fisheries.

Lessons learned

Throughout the 5-year project period, numerous lessons were learned from all ECOFISH stakeholders during the implementation and consultation processes.

1. Stakeholder engagement is vital to establish co-management

Co-operation between public and private sectors, including local elected representatives, was critical to the success of co-management. Motivated *arotder* and other influential people at the landing centers functioned as agents of change for introducing adaptive co-management into the hilsa fishery. A good relationship with the

DOF and other service providers motivated poor fishers to demonstrate their eagerness to obey the fisheries legislation of the government. Among fishers, fear of government control, penalties and imprisonment need to be transformed gradually into joint ownership, engagement and collaboration, and fishers must be given an effective voice in co-management for it be successful. Improved hilsa and catfish production, larger fish sizes and increased income increments among fishers proved that co-management could be effective.

2. Support for fishers' livelihoods and alternative income generation is essential

Need-based support for the fishing communities is essential to co-manage any natural resource effectively. Through assessing family needs and existing facilities, ECOFISH was able to determine the type of support suitable for improving livelihoods. One example is a pond owner who needed support for aquaculture. Another example is a family that wanted to get a cow or a goat for its cattle/goat rearing facility. In addition, a fisher needed help getting a boat and nets for other non-farm AIGAs because he had no facility of any kind.

In general, communities need long-term livelihood support as well as appropriate skill development training, on top of the rice support that the GOB provides. The alternative livelihood support for goat rearing and vegetable gardening encouraged participation among women. A cost-sharing strategy would be beneficial for livelihood asset distribution. This would build community ownership to ensure sustainability.

3. The participation of fisherwomen in co-management and decision-making

Before ECOFISH, women in fishing communities had very little control over decision-making and none over overfishing activities. They also remained unemployed and had limited access to finance and savings. After the interventions, women showed a willingness to receive training for AIGAs. They also successfully operated CSG activities and actively participated in the annual conference for fisherwomen. Women effectively participated in co-management activities by attending HCG meetings and motivating their family members to refrain from catching *jatka* and brood hilsa. Using their savings and AIGA activities,

they were also able to help their families financially to improve compliance with fishing regulations.

4. Community fish guards: A helpful approach for improved compliance

The role of CFGs provided additional community support to the DOF and law enforcement among *ghat*-based (landing center) stakeholders. They were useful in implementing the fishing bans and preventing the use of illegal fishing gear. As a result, integrating CFGs into the DOF as auxiliary law enforcement would help ensure sustainable co-management.

5. The Hilsa Conservation and Development Fund: An innovative tool for sustainable management

ECOFISH established the HCDF fund to generate an operational fund for hilsa management, and it will continue to do so indefinitely to provide a continual source of funding for sustainable hilsa

management. However, it is obvious that enlarging the fund is necessary to provide more outputs that are visible.

6. Citizen scientists are effective in catch monitoring

Engaging trained boat skippers as citizen scientists was effective in monitoring fish catches as well as for biodiversity conservation, focusing on megafauna and juvenile hilsa. Under the DOF, this approach could be scaled up for reliable catch monitoring of artisanal fisheries.

7. Efficient MEL data generation and management are essential for project impact evaluation

Well-designed and strong data acquisition, data management, analysis and reporting were all important in proper monitoring, evaluation and learning, as well as for project impact evaluation purpose.



Hilsa conservation group, Bangladesh.

Contribution to Sustainable Development Goals and Aichi Biodiversity Targets

Biodiversity Targets

As part of global and national efforts, ECOFISH contributed to meet [Sustainable Development Goals \(SDGs\)](#) and [Aichi Biodiversity Targets](#). Through sustainable management of the hilsa fishery, the main anadromous marine species, the project was able to achieve SDG 14 (conserve and sustainably use the oceans, seas and marine resources for sustainable development) by focusing specifically on SDG 14a (increase scientific knowledge, develop research capacity and transfer marine technology). The interventions generated scientific information necessary for management and trained about 20,000 stakeholders to support management. This was accomplished through adaptive co-management that was able to raise hilsa production up to a sustainable level while also improving biodiversity.

To achieve SDG 14b (provide access for small-scale artisanal fishers to marine resources and markets), the project increased access and improved production of hilsa, which makes up 51% of the small-scale artisanal fishery. ECOFISH facilitated the government's declaration of the [Nijhum Dwip Marine Reserve](#) to protect the endangered fish and megafauna at the mouth of the world's third-largest river system. It also protected the migration

routes and highest priority spawning grounds of hilsa. Declaring this a marine reserve brought Bangladesh one step closer toward meeting its national goal and international obligation under the Convention on Biodiversity Target 11 and SDG 14.5 to conserve 10 percent of its marine waters through an ecologically representative and well-connected system of protected areas.

The outcomes also indirectly supported SDG 1 (end poverty in all its forms everywhere) as income among fisher households increased 52%, which will reduce poverty significantly. It also supported SDG 2 (end hunger, achieve food security and improved nutrition) as annual hilsa production increased 11%, up from 5%. The outcomes also supported SDG 3 (ensure healthy lives and promote well-being for all at all ages) through improved production of fish that is high in protein, high in lipids, and rich in both Omega-3 and polyunsaturated fatty acids, all of which are important for health. Finally, the project supported SDG 5 (achieve gender equality and empower all women and girls) by improving access to financing through CSGs. These empowered women and increased the resilience of the coastal fishing communities.



Conclusion

ECOFISH succeeded in reviving the declining hilsa shad fishery in the Gangetic River systems as well as the Bay of Bengal. At the heart of this success were the concerted efforts of the fishing communities and various stakeholders in the value chain along with government support from departments and organizations like the DOF and the BFRI, as well as administration and law enforcement. Together, this made it possible to increase hilsa production and strengthen the biodiversity of river fisheries along the vast Padma and Meghna rivers and their various tributaries.

Anecdotal evidence suggests that hilsa production has increased in the Indian rivers of the Gangetic riverine systems. In a surprise development in neighboring India, the country adopted concerted water management and fisheries management efforts to keep the doors of the Farakka Barrage open during the hilsa breeding season so that the fish could migrate from Bangladesh to India. To bring about this change, ECOFISH activities adopted science-based decision-making in the adaptive co-management of the hilsa sanctuaries and improved the socioecological livelihoods of the fishing communities reliant on hilsa fisheries.

All ECOFISH activities were based on science and have been included in the updated version of the HFMAP. The policy supports the MOFL on a variety of measures that will sustainably benefit conservation and development of hilsa and other coastal fisheries in the long-term. These include the 22-day brood hilsa-fishing ban, the 6.5 cm allowable mesh size for hilsa gillnets, the declaration of the Nijhum Dwip Reserve as an MPA, and the formulation of co-management committees at different tiers for adaptive co-management in the riverine ecosystems. Another important aspect is institutionalizing the various co-management building blocks—especially CFGs, CSGs and all FMCs and co-management tiers—by integrating them into the DOF. This would provide the government with a sustainable direction to better manage the country's biodiversity conservation programs for both inland and marine fisheries.

Although it was challenging to establish adaptive co-management in a large river ecosystem like the Padma-Meghna, the efforts were successful at recovering fish stock, improving biodiversity and increasing the income of fishing communities. The livelihood supports through the project's AIGAs also significantly improved household income. This resulted in reduced poverty and visible improvement in the livelihood resilience of the coastal fishing communities and could be scaled in all other fishing communities through similar upcoming development programs.

The synergistic impacts of ECOFISH's interventions increased the total hilsa catch in Bangladeshi waters from 5% to 14%, and as high as 30% in the inland rivers, during the first 2 years of implementation. As an additional benefit, four species of large river catfish (*pangas*, *rita*, *ayr* and *baghayr*) also increased remarkably in both size and abundance, which increased both income and opportunities among fishers. As a result, household income among fishers increased 65%, which led to improved livelihood resilience and a 15% reduction in poverty. Savings among women for improving access to finance through CSGs in every targeted fishing village resulted in an increased capital of USD 159,000. This has made access to soft loans much easier for fishing households, especially during fishing ban periods, to help fisher families tap into alternative livelihood opportunities. This unique innovation has both increased the voice of women in family and community decisions and has led to empowerment, which have provided women with opportunities to take part in income generating activities. ECOFISH's holistic livelihood support strategy, in the form of model resilient fishing villages, remains an example for future pro-poor development initiatives in Bangladesh as the country continues to explore its dream of a thriving Blue Economy. Finally, scaling the success of USAID's ECOFISH activity in Bangladesh to coastal and marine fisheries and biodiversity conservation could greatly benefit the marine ecosystems and fishing communities of this maritime nation.

Notes

- ¹ For more details, see the WorldFish press release ([WorldFish joins oil spill clean-up team in Bangladesh](#)) and blog ([Sundarbans recovery: Ecosystem resilience post oil spill](#)).
- ² Hollows E. 2014. Consideration of the co-management of hilsa fisheries associated with the ECOFISH^{BD} Project: Opportunities and challenges. Technical Report, ECOFISH.
- ³ Apu NA. 2015. Rapid assessment of the fishing villages around five hilsa sanctuaries in Bangladesh. Technical Report, ECOFISH.
- ⁴ Kleiber. 2014. Consideration of gender in the ECOFISHBD project: Opportunities and challenges. Technical Report, ECOFISH.
- ⁵ See the [ECOFISH research output published in *Marine Policy*](#) for more details.
- ⁶ For more information, see the following press release: [Threatened Bangladeshi national fish target of new conservation program](#).
- ⁷ Khan et al. 2020. Value chain impact of the increased hilsa shad (*Tenualosa ilisha*) harvest in Bangladesh. Accepted in *International Food and Agribusiness Management Review*.

Annex 1. ECOFISH's theory of change (TOC), Version 5



Annex 2. ECOFISH publications

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Annex 3. ECOFISH outputs

Year	Title	Type of publication
2019	Hilsa Fisheries Management Action Plan (HFMAP)	Management plan
2019	Nijhum Dwip Marine Reserve Management Plan	Management plan
2019	Small-Scale Fisheries Symposium	Proceedings
2019	Central Stakeholders' Consultation Workshop on Selecting Appropriate Mesh-Size for Hilsa Gillnets	Proceedings
2018	Status and Potential of Ecosystem Approach to Fisheries Management (EAFM) in Bangladesh	Technical report
2018	Conceptualize the Sustainable Payment for Ecosystem Services (PES) for Hilsa Conservation and Equitable Distribution of Benefits to the Coastal Fishers of Bangladesh	Technical report
2018	Hilsa Fisheries Co-Management Guideline	Guideline
2018	Comprehensive Livelihood Strategy	Strategy
2017	Power and Incentives in Hilsa Fishery	Study report
2017	Stakeholders Dialogue on Marine Tenure and or & Small-Scale Fisheries in Bangladesh	Workshop report
2017	Institutionalization of Co-management Arrangements in the Andharmanik River Sanctuary	Study report
2017	Population, Habitat Status and Conservation of Three Globally Threatened Wader Species along the Coast of Bangladesh	Study report
2017	Ecological and Socio-Economic Assessment of Nijhum Dwip Seascape: A Framework for Designating and Managing a Potential Site for Marine Protected Area (MPA) in Bangladesh	Technical report
2017	Hilsa Fisheries Management Action Plan	Brief/Handbook
2017	Fishers Women Savings Management Guideline	Guideline
2016	Balancing Community Fishing Needs with the Protection of Marine Megafauna at Extinction Risk from Entanglement in Fishing Gears	Technical report
2016	Co-Management Feasibility Study: Andharmanik River Sanctuary	Technical report
2016	Spawning Season and Brood Ban Period of Hilsa	Science report
2016	Fishers' Women Congress	Congress report
2016	Potentials for AIGAs for Fishermen and Women in ECOFISH Working Areas	Technical report
2016	ECOFISH Baseline	Study report
2016	Environmental Monitoring and Mitigation Plan (EMMP)	Plan
2015	ECOFISH Gender Strategy	Strategy
2015	Rapid Assessment of the Fishing Villages around Five Hilsa Sanctuaries in Bangladesh	Technical report
2015	Consideration of the Co-Management of Hilsa Fisheries Associated with the ECOFISH Project: Opportunities and Challenges	Technical report
2015	Consideration of Gender in the ECOFISH: Opportunities and Challenges	Technical report
2015	Hilsa Market Systems and Governance Strategy	Technical report
2015	ECOFISH Communications Strategy	Strategy
2015	ECOFISH Monitoring, Evaluation and Learning plan	Plan
2014	ECOFISH Stakeholder Consultation Workshop	Workshop report

Annex 4. ECOFISH training materials

Year	Manual	Target audience
2018	ToT manual on Ecosystem Approach to Fisheries Management (EAFM)	EAFM practitioners and fishery managers
2017	Training manual on Ecosystem Approach to Fisheries Management (EAFM)	Co-management leaders and local level practitioners
2017	Business literacy training course book	CSG members
2017	Training manual on co-management of the hilsa sanctuaries	Co-management leaders
2017	Training manual for community fish guards	Community fish guards
2017	Training manual on hilsa sanctuary surveillance	Government officials and law enforcement
2016	Training manual on leadership and institutional development	HCG leaders
2016	Training manual on household poultry and vegetable farming	HCG members
2016	Training manual on duck rearing and vegetable farming	HCG and CSG members
2016	Training manual on goat rearing and vegetable production	HCG and CSG members
2016	Training manual on pond fish culture and vegetable production	HCG members
2016	Training manual on vegetable production-final	HCG and CSG members
2015	HCG learning session manual (sessions 1–24)	HCG members and HCG facilitators

Annex 5. ECOFISH workshops

Year	Title	Purpose	Event #	Participants (#)			Participants
				Male	Female	Total	
2019	National Symposium on Small Scale Fishers	To share knowledge on small-scale fisheries management in Bangladesh	1	53	8	61	MOFL, DOF, BFRI, universities, international organizations, USAID, NGOs, fishers associations, WorldFish
2019	District Hilsa Co-Management Council Formation	To form district hilsa co-management committees in Barishal, Bhola, Chandpur, Laxmipur, Shariatpur	5	266	38	304	District commissioner, DFO, government organizations, law enforcement, civil society, freedom fighters, local government, fish traders, fishers
2019	Appropriate Mesh Size for Hilsa Gillnet	To select the allowable mesh size for hilsa gillnets	1	28	4	32	MOFL secretary, MOFL, DOF, BFRI scientists, fishers, law enforcement, Dept. of Environment & forest, WorldFish, journalists
2019	Updating the Hilsa Fisheries Management Action Plan (HFMAP)	To share knowledge and experience among stakeholders on hilsa management and integrate the opinions in the revised HFMAP	1	55	6	61	MOFL and DOF officials, BFRI scientists, BFFEA, universities, river police, coast guard, DOE, forest, WCS, IUCN, WorldFish, fishers, fishers associations
2019	Upazila Hilsa Co-Management Council Formation	To form upazila hilsa co-management council at Hizla, Mehendiganj Upazila, Barishal	2	75	26	101	Fishers, <i>arotder</i> , upazila chairman, UNO, DOF
2019	Hilsa Fisheries Development and Management Strategy	To review past and present activities and identify future hilsa research and development agenda	1	72	8	80	Education minister, MOFL secretary, MOFL, DOF, BFRI scientists, fishers, law enforcement, Dept. of Environment & forest, WorldFish, media personnel
2018	Potential Interventions for Building Resilience of the Host Fishing Communities	To share experience about recent scoping visits to Ukhiya and Teknaf by the WorldFish/ECOFISH team	1	14	3	17	USAID, DOF officials, administration, Naf River fishers, fishers associations
2018	Genetic Differences in Hilsa and its Management Implications	To share the findings on the genetic differences of hilsa in different habitats and its management implications	1	32	8	40	DOF, BFRI, ACI, NGOs, USAID, WorldFish
2018	Mainstreaming EAFM in Bangladesh	To strengthen the capacity of Bangladeshi fisheries practitioners in EAFM		29	9	38	DOF, BFRI, universities, NGOs, WorldFish

2018	Marine Protected Area (MPA) at Nijhum Dwip	To share the progress of establishing the MPA at Nijhum Dwip	4	42	47	MOFL, DOF, FD, DOE, BCG, RP, NAVY, IUCN, WCS, PSTU, WorldFish, <i>Matsyajibi Samiti</i>	
2018	Delivering ECOFISH Science Outputs	To share ECOFISH science outputs with DOF and other government officials	77	28	105	DOF officials, WorldFish scientists	
2018	Progress Evaluation and Planning	To assess the progress of activities of the ECOFISH and plan for next 3 months	32	5	37	DOF officials, WorldFish, USAID, BFRI, CODEC, CNRS, COAST Trust	
2018	Hilsa Value Added Product Development	Getting opinions from stakeholders about prospects for marketing hilsa soup and noodles	16	4	20	Officials from DOF, WorldFish, BAU, DU, BFDC, BFFEA, Krishibid Bazar, <i>Meena Bazar</i> , ACI, Virgo Fish & Agro Process Ltd.	
2018	Upazila Hilsa Co-Management Council Formation	To form hilsa co-management councils in different upazilas	8	391	94	485	Fishers, <i>arotder</i> , upazila chairman, UNO, DOF
2017	Hilsa Conservation and Development Fund	To finalize guidelines on the Hilsa Conservation and Development Fund	2	43	5	48	DOF, WorldFish
2017	Hilsa Guard Initiative of ECOFISH-Bangladesh	To ensure support from relevant stakeholders for implementing the hilsa guard initiative	1	14	2	16	DOF, river police, coast guard, WorldFish
2017	Stakeholders Dialogue on Marine Tenure and Small-scale Fisheries	To get recommendations from different stakeholders for introducing ecosystem-based management	1	40	4	44	DOF, USAID, BFRI, WF, PPRC, WCS, IUCN, CNRS, CODEC, Coast Trust, BACS, CREL, CGEIS University (Middlesex/Tetra Tech, Sylhet Agriculture), journalists (Daily Star, Daily <i>Prothom Alo</i>)
2017	Upazila Hilsa Co-Management Committee	To form an upazila hilsa co-management committee in Bhola Sadar, Bhola	1	60	2	62	Fishers, <i>arotder</i> , upazila chairman, UNO, DOF
2017	Adaptive Co-Management for Hilsa Conservation	To design and outline the co-management model for piloting	2	131	20	151	Fishermen, <i>arotder</i> , local government, DOF, coast guard, police, others government offices, ECOFISH staff
2017	Workshop on Community Led Patrolling Volunteers	To identify the capacity building needs of hilsa guards	1	46	3	49	MP, police, DOF, local government, civil society, <i>arotder</i> , fishermen, ECOFISH staff
2017	Workshop on Fixing Hilsa Brood Ban Period	To explore findings on the appropriate length of the hilsa brood ban	1	34	3	37	DOF, BFRI, WorldFish
2017	Workshop on Media Engagement	To increase skills for writing press releases and handling journalists	1	14	5	19	ECOFISH staff

2016	Annual Planning Workshop	To prepare the ECOFISH Annual Work Plan for Year 3	1	36	8	44	ECOFISH and WorldFish staff, implementing partners, DOF, BFRI
2016	Consultation Workshop	To share progress of project and monitoring perspective of DOF	1	25	3	28	WorldFish and DOF officials
2016	Participatory Community Action Plan Development	To identify problems in resource management and livelihoods and develop an action plan	70	143	39	182	<i>arotder, mohojan, vagi</i> , fishermen, PNGO Staff
2016	Stakeholders Consultation Workshop on Co-management	To identify the co-management prospects and challenges for its implementation	1	69	3	72	HCG members, landing center leaders, DOF, local government, ECOFISH, journalists, police, coast guard, CRC/URI, USA
2016	HCG Capacity Building	To prepare a draft implementation guideline for capacity building of HCGs	1	26	4	30	HCG members, ECOFISH staff
2016	M&E Workshop	Develop the resilience impact evaluation framework	1	11	4	15	Consultant, USAID representative and WorldFish staff
2016	ECOFISH Implementation Modality	To build capacity on the participatory tools for community profiling	1	39	5	44	ECOFISH staff, DOF officials
2016	Comprehensive Community Profiling	To build capacity on participatory tools for community profiling	1	29	4	33	WorldFish, NGO staff, ECOFISH staff
2016	Stakeholder Consultation on Co-management	Develop riverine fisheries co-management strategy	1	32	6	36	Scientists and NGOs involved in different projects funded by USAID, DANIDA, DFID and IFAD
2015	Staff Orientation Workshop	Getting orientation on research plans; team building skills	1	6	4	10	ECOFISH senior team and HQ senior staff
2015	Team Building and Inception Workshop	Provide project concept, objectives, activities and implementation guidelines	1	28	2	30	DOF, WorldFish, implementing partners
2014	Stakeholder Consultation Workshop	Developing and programming the TOC for the project	1	53	7	60	USAID, DOF and WorldFish staff, BFRI, BARC, BAU, BCAS, CEGIS, CNRS, PPRC, URI/CRC, FAO, IUCN, iDE

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 a member of CGIAR, the world's largest global partnership on agriculture research and innovation for a food secure future.