



American Journal of Development Studies (AJDS)

ISSN: 2837-6676 (ONLINE)

VOLUME 3 ISSUE 1 (2025)

PUBLISHED BY
E-PALLI PUBLISHERS, DELAWARE, USA

Fisher's Capacity Building for Responsible Fisheries in the Bay of Bengal

Anusree Ghosh^{1*}

Article Information

Received: February 18, 2025

Accepted: March 24, 2025

Published: April 17, 2025

Keywords

*Bay of Bengal, Biodiversity
Conservation, Fisher, Skill
Development, Training*

ABSTRACT

The area of the Bay of Bengal that Bangladesh owns is around the same size as the country. That huge marine water area supports a wide number of biodiversity including 475 species of finfish and 36 species of shrimp. The biodiversity of the Bay of Bengal is under risk of over harvesting. There are laws and legislations regarding the conservation and protection of marine biodiversity. But there is a serious lack of conservation knowledge and practices by the sea going fishers. Capacity building intervention for the sea going fishers are a few. The current paper has assessed and reviewed a capacity building training programme of an NGO in the Cox's Bazar coast. Using the participatory research tools and questionnaire survey, they compare the knowledge and practice status of the community before the training and after the training. The impact of training to the fisher was found very effective. The study was conducted between November 2021 and February 2023 in four villages of the Teknaf Peninsula. Training brings significant changes in the practice and behavior of fishers. Developing training contents and modules needs to consider the local conservation pressures, traditional practices, and the capacity of law and entitlements. Technological knowledge of safe release back to sea of the accidental catch is a requirement for the fisher community. Attention towards capacity building of fishers by the Government and Non-government was found to be very low. To achieve the country's target of the blue economy, skill development of the fishers on responsible fisheries is a must.

INTRODUCTION

The south border of Bangladesh is the Bay of Bengal. The country's coastline is 750 km long. The country owns 118,813 km² area of territorial sea. Also, the country owns 200 nautical miles of Exclusive Economic Zone and all kinds of animal and non-animal resources under the continental shelf up to 354 nautical miles from the Chattogram coast. The normal fishing boats area operated up to 40 meters in depth from the coastline, the ordinary fisherman, i.e., fishers with regular fishing boat and small trawlers area fishing meters in depth from the coastline, and the ordinary fisherman, i.e., fishers with regular fishing boats and small trawlers are fish there. In the area from 40 m to 200 m in depth midwater trawlers are operating; from 200 m in depth to the end of the Exclusive Economic Zone where long-liner trawlers run (Islam *et al.*, 2017).

Around 32,440 km² starting from the coastline to 40 m depth in the Bay are open to fishing. There three types of vessels, viz., commercial trawlers, mechanized boats and artisanal boats are engaged in fishing in rivers and sea across 14 coastal districts and 67 upazilas of the country. Currently, there are 3,231 registered commercial trawlers and 28,500 registered mechanical boats in the country (Shamsuzzamn *et al.*, 2020). Due to a lack of enrollment, the exact number of artisanal vessels has still remained unknown. However, the number has been estimated at around 65,000, as per the average count of fishermen. The marine water area of Bangladesh supports a good

amount of biodiversity. Compilation from a different published list of the marine biodiversity of the Bay of Bengal of Bangladesh shows that there are 475 species of finfish, 36 species of shrimp, 16 species of crab, and 165 species of seaweed. 55.48% of the country's total production of Hilsha came from the Bay of Bengal. Hilsha is the national fish of the country. Bangladesh. Overall, marine fisheries contribute 15% of the total fisheries production of 4.621 million metric tons (MT) during 2020-2021 (Tora, 2022).

The Bay of Bengal is hosting a wide range of biodiversity, such as fishes, shrimps, mollusks, crabs, mammals, seaweeds, etc. Around 511 marine species are recorded from the Bay of Bengal of Bangladesh.

Table 1: Biodiversity of Bay of Bengal of Bangladesh

Bony fish	475
Cartilaginous (soft-boned) fish	50
Shrimp	56
Crab	50
Lobster	5
Mollusk (Oyster)	336
Algae/Seaweed	168
Coral	66
Starfish/Echinoderms	4
Whale/Dolphin	11
Squids (Cuttlefish)	7 (2)

¹ School of Education, Bangladesh Open University, Bangladesh
*Corresponding author's e-mail: anusree@bou.ac.bd

The Sundarbans and the St. Martin's Island areas are the most biodiversity rich locations. The boats catching fishes between Cox's Bazar and St. Martin's reported the most diversity after the catch near the Sundarbans. The potential of the coastal fisheries sector has not been rationally harvested. Over harvesting is the main challenge of fisheries resource decline in the Bay of Bengal. The artisanal fishing is mostly on near shore coastal areas. Nearshore fisheries are overexploited. The fishers are using very harmful fine nets for fishing. To protect the fisheries resource, it is very essential to control the over harvesting. Not all fishes in the sea are that significantly commercial. The fine net catching resulted in non-target and non-commercial harvest also. Though nowadays non-commercial gross catches are also sold to poultry industry as feed.

Non-Government Organizations in Bangladesh are working with the fisher community for sustainable fisheries. The current paper is based on the experiences of an NGO working for community awareness building on the conservation of marine biodiversity by sustainable fisheries. The NGO has implemented a project in the village Sabrang of Teknaf to raise the awareness of sustainable fisheries. Based on the state of conservation knowledge and fishing practices a training module was developed and 200 fishers were trained with this module. The paper aims to highlight the importance of conservation knowledge for the fisher towards responsive fisheries.

LITERATURE REVIEW

There are initiatives from the government towards responsible fisheries. Those are mostly the enforcement of law and order and in most of the cases designed for the inland fisheries. Rahman (2018) has identified that twelve fisheries regulations are executed for the regulation and management of the fisheries resources in the country. A few historical laws are implemented with some amendments towards the development of legal mechanisms for the Fisheries Development of Bangladesh. The implementations of these laws often met limited success due to a number of shortcomings in the legislations. The constraints in the implementation are the lack of clear policy guidelines and strategy, inadequacy of existing regulatory framework, non-enforcement of legislation and jurisdictional conflicts, the absence of regular law review and updating mechanism and formulation of by-laws, rules, orders etc. Tora *et al.* (2023) has documented the future perspectives of marine fisheries; climate change has been identified as one of the major challenges. They have detailed the potential of the blue economy. The awareness raising of the fisher has been noted as a recommended action. There was a suggestion to capacity building of the fisher relating to marine aquaculture. Conservation awareness attempts for marine fishermen are significantly limited. Rahman

and Shansuduha (2018) concluded that until recent years, the conservation and management of coastal and marine living resources have received lower priority in comparison to inland fisheries and other land-based ecosystems. Since the government of Bangladesh is committed towards the conservation of the environment there is potential of training and capacity building for conservation of marine resources. By reviewing the literature, it was found that during the first decade, very specifically during 1995 to 2010 there were a good number of attempts taken for environmental education and awareness for nature conservation. During this time few attempts were made to alert the coastal fishers. Chakraborty (2004) has detailed the importance of training in conservation of marine biodiversity. He has reviewed the capacity of awareness raising initiatives by the development sectors. Chakraborty and Hossain (2016) have emphasized all aspects of a fisheries life to conservation in the conservation education. Ecosystem conservation needs to consider aspects from breeding biology of the species to the market price. The characteristics of a 'good participatory conservation model' should be specified by the community, scientists, practitioners and policy makers for the wellbeing of the Bay of Bangle. FAO (2019) has published a comprehensive training module but the conservation of non-fish marine wildlife has not been included that significantly, but a very good source of information. Sawrey *et al.* (2017) has conducted a detailed and comprehensive study on the importance of training in conservation. They analyzed a case from Mauritius. Perception of control and work environment should therefore be considered when designing conservation training programmes, and the effectiveness of teaching conservation theory and networking should be examined further. According to UNESCO the erosion of indigenous and local knowledge and the associated decline in sustainable traditional land use threatens biodiversity and ecosystems services. Conserving biodiversity requires an inclusive approach that speaks to and involves everyone. Developing a sustainable harvesting guideline and management plan and other awareness materials were strategic responsibilities of the Department of Fisheries in cooperation with the Department of Environment by the National Biodiversity Strategy and Action Plan of Bangladesh (DoE, ND).

MATERIALS AND METHODS

To understand the state of fishing practice, biodiversity conservation knowledge, and the impact of conservation education, semi-structured questionnaire surveys were conducted in 4 coast villages of the Teknaf peninsular, viz., (1) Kocchopia, (2) South Silkhali, (3) North Shilkhali and (4) Boro dail. The population and household of those 4 fishing coastal villages area as follows, considering 90% confidence level and 5% margin of error 215 households were selected randomly for the survey.

Table 2: Population and Household Surveyed

Sl	Village Name	Population	Household Number	Surveyed Household
1	Kocchopia	1250	185	40
2	South Silkhali	1720	255	54
3	North Shilkhali	3340	422	90
4	Boro dail	1012	144	31
	Total	7322	1006	215

The semi-structured questionnaire that was used in the survey that were concluded before the training of the fishers included question on the Fishing gear, fishing season, fishing spots, length of fishing trip, dependency on natural resources for livelihoods, dependency on marine biodiversity for livelihoods, biodiversity of sea and its conservation challenges, frequency of accidental or unwanted catch and their actions, breeding season of marine aquatic animals, awareness about the conservation law, etc. The survey that was conducted after the training has reduced the questions numbers but included questions on dependency on marine biodiversity for livelihoods, biodiversity of sea and its conservation challenges, frequency of accidental or unwanted catch and their actions, breeding season of marine aquatic animals, awareness about the conservation law, etc. Both the surveys were conducted with the same households. The gap between the two surveys was one year, the first survey was conducted during November 2021 and the second was in February 2023. The data was coded and was analyzed using the SPSS programme of statistical analysis.

There were 2 Focus Group Discussions with seagoing fisher to understand the training need assessment. The discussion was concentrated on the understanding of fisher on the importance of biodiversity, the value of non-commercial fisher for sea productivity and the knowledge of the release technology of non-targeted accidental catch.

RESULTS AND DISCUSSIONS

Practices and conservation knowledge of Fishers before the training

Around 34% of the households of Teknaf are engaged in fishing. Average earning of a fisherman here is 4,500 Taka/month. The fishermen of Teknaf were found fishing in the sea for 10 months except the month June and July because of rough weather. In the Cox's Bazar coast the pick cyclone season in average is the June-July. The average distance of the fishing place from their village was found within 0.5 to 0.6 km. Jellyfish, fingerlings of a number of fish species, shark juveniles, larvae of different crab and lobster species, etc., were undesirably trapped during different types of fishing practice. Cetaceans and marine turtles are also undesirably trapped by the fishers during finishing. Accidental catch of the marine turtles was recorded more frequent from November to January. Around 87% respondent claimed that, they have no alternative livelihood opportunities. The knowledge of the community regarding fishing law was 2% only. None of the fisher no about the concrete locations of the marine protected areas.

Community Identified cause, effect and solution

During the training need assessment cause of biodiversity loss in the coastal areas near Baharchara of Teknaf was identified by the community. The findings were as follows:

Table 3: Solution of marine biodiversity conservation identified by the sea gong fisher

Trawling in shallow	Trawling in shallow	Solution
Destructive nets	Unemployment	Ban on shrimp fry and mother fish catching and use of destructive net
Mother fish harvest	Less supply resulting higher price of fishes	Ban or restriction on year-round harvesting
Shrimp fry collection	Finance crisis	Planting mangrove
Number of fishing boats is too many	Sea side erosion	Alternative income
Fishing round year	Fishermen has to go into deep sea and staying longer period for catching fish	Safe breeding ground for turtle.
Disturb in fish habitat		Create awareness
Over harvesting of shells		Enforce laws
Lack of knowledge		

Content of the training Module

Based on the conservation problem and the state of practice the training module was developed for the fishers. Since time management for the fishers was a challenge, the training module was developed for half day only. The training module was developed in the native language Bangla. This training manual is written as a rapid reader also; by reading the reader can easily identify her or his action points towards conservation of the biodiversity of the Bay of Bengal. The content of the training module is described below:

Immediate action to conserve marine biodiversity is a must because we are too late to have a better plan. Our sea is polluted. If we are late to take action by 2030 the total weight of plastic in the sea will be more than that of fish. To feed the population in the era of climate change, dependence on the sea is rapidly increasing. The Bay of Bengal provides many ecosystem services including fisheries. Many people from the coastal areas are dependent on the fisheries resources. Navigation support, tourism, flood control and climate regulation are other important ecosystem services. As marine living resources are renewable, there is certainly a need to pursue conservation measures in order to secure sustainable management of these resources. Though the law of the sea is one of the oldest areas of international law but not really known to the fisher community including other stakeholders who are dependent to the sea. The Bay of Bengal is an area of high biodiversity, there are many endangered and vulnerable species found in the Bay of Bengal part of Bangladesh. Degradation of mangrove, coral reefs were found in a very alarming rate. The coastal marine habitats of the Bay of Bengal are important for the food security of coastal communities and provide natural defenses that reduce damage to coastal areas from waves and wind. They are of considerable social and economic importance, with activities such as fishing, shrimp farming, tourism and shipping contributing to food security, employment and national economies. All these activities are placing increasing pressure on the sustainability of critical habitats and resources. For the conservation of marine habitat, there are marine protected areas. Bangladesh has already achieved the target of SDG 14.

There were 4 sessions in this module, viz.

1. Biodiversity, Marine Biodiversity and the Biodiversity of the Bay of Bengal;
2. Marine Pollution, Climate Change and the Threat to the Marine Biodiversity;
3. Marine Biodiversity Protection Law, Technologies and Blue Economy;
4. Conservation of Marine Biodiversity.

The session # 1 of the module details the definition and classification of biodiversity. The food chain, carrying capacity and inter-dependence were described to detail the importance of biodiversity. The marine biodiversity and the biodiversity of the Bay of Bengal and the sea area of Bangladesh were briefed. Session # 2 detailed the

cause of marine pollution and the pollutants. The Bay of Bengal pollution was detailed pictorially and with the maps. There was a map of prime fishing areas in the Bay of Bengal. Session #3 includes a brief description of the marine protection and biodiversity conservation laws and also the map of the marine protected areas in the Bay of Bengal. The blue economy includes the potential economic use diversifiable and the importance of sustainable harvesting of marine biodiversity for the blue economy. Session #4 of the module detailed technology of safe rescue and release of the trapped animal. The training module was pictorial.

With this module 200 sea going fishers were trained. There was a significant change in the behavior of the fishers after the training.

Changes in fishers' behavior and practice after the training By receiving the training, the fishers were able to understand the value of biodiversity. The fishers were practicing immediate release of juveniles and non-target catch. Releasing juveniles into the sea in living conditions has been increased from 30% to 70%. Around 51% of households were aware regarding the safe releasing of the juveniles that were trapped unexpectedly. Almost all the fishers of those coastal villages know about the breeding season of fish and other marine species. The knowledge about fishing rules or law of government regarding fishing and marine protected areas is only known moderately by 33% of the trained fishers. Here moderate means know about the law and also understand that not following the law is an offence. This fisher community is still reluctant to shift from their traditional occupation of fishing, only 11 Households out of 1004 have explored alternative livelihoods.

Discussion

The study found that training has a significant contribution towards behavioral changes. The Department of Fisheries, Government of Bangladesh has a good number of training materials and modules, including videos for hands-on training. But all the materials are for increasing production, training materials for ecosystem wellbeing and conservation of biodiversity were not developed. The Department of Environment has developed a Blue Economy Action Plan (BEAP) as a part of the Government initiative on preparation and implementation of the Blue Economy Action Plan for the country. Bangladesh was committed to Aichi Biodiversity Targets # 11 of the Convention for Biological Diversity that set a target of 3% area under inland wetlands and coastal ecosystems and 5% of total marine area will come under Protected Areas or Ecological Critical Area with development and implementation of management plan for these areas. Towards SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development, the National Priority Target 33 was expanding the coverage of protected areas in relation to marine areas by 5% (SDG Indicator 13.5.1). With five marine protected areas, viz., Bay of Bengal's

Middle Ground and South Patches Marine Reserve, St. Martin Island Ecological Critical Area, Swatch of No Ground as Marine Protected Area and Naf Peninsula Marine Protected Area, the country has around 10% of its marine area protected. Limited scientific study and data on marine ecology, habitat, species, stocks, etc. are major setbacks for Marine Protected Areas of the Bay of Bengal (Hossain, 2019). During the study it was found that the sea going fisher area was not properly aware about the Marine Protected Area. A government initiative of rising awareness among the fisher is very necessary. In that case short duration training can be conducted. Community Engagement and Education for fisheries biodiversity conservation is very important. Engaging local communities, stakeholders, and resource users is vital for successful fish biodiversity conservation. Fishing ban season declaration and law enforcement were found very effective for the production increase of Hilsha fish. But community orientation and fisher training on 'fishing ban' could have help the conservation effort of the government. Promoting awareness, education, and capacity-building initiatives helps foster a sense of stewardship and encourages sustainable practices among local communities. Involving indigenous peoples and incorporating traditional knowledge can also contribute to effective conservation strategies (Gillette *et al.*, 2023). According to Truchet *et al.*, 2019 construction of knowledge about coastal and marine environments with the input of fishers is fundamental. Rahman (2025) suggested that by fostering a deep sense of ownership and responsibility for ocean health, these efforts unite the livelihoods of fishing communities with the mission of conserving marine ecosystems. Harmonious connection between fishers and nature shows how local engagement can protect endangered species while promoting sustainable ocean stewardship. The current study found that capacity building and creating responsible touch between the fisher and nature is possible by making them understating the importance of non-economic biodiversity. More scientific research is required on the rescue and safe release of aquatic animals like turtles and dolphins. After receiving the training, the fishers have released back 85 animals in living conditions of which 14 were sharks and more than 20 jelly fishes, but the final conditions of those animals were unknown. Non-target catch areas are in most cases the key species in Bay of Bengal, like dolphin and marine turtle. Loss of key species from an ecosystem can disrupt ecosystem processes, leading to changes in primary productivity, nutrient cycling and food web dynamics. (George *et al.*, 2024). It's very essential conserving those key species and for this conservation education for this fisher is urgent. Wildlife Institute of India has designed a good number of training programmes (Khera & Sivakumar, 2014), but training modules to fishermen directly were not common. The business of the sea going fisher is interfered with by many factors, fishing availability, ban season, disaster and extreme event days, market place time, etc. Based on

the factors the training and training schedule needs to be developed.

CONCLUSIONS

There is a lack of conservation awareness and education for the coastal fisher community. The study found that only 4 hours of training for the fisher could have made a very significant change in the behavior of the fisher towards marine biodiversity conservation. Attempting the immediate release of non-target catch to the water could have contributed hugely to marine biodiversity conservation and fisheries protection. The study highly recommends raising awareness for seagoing fishers through non-formal education and orientation. That could be an independent capacity-building intervention or an added curriculum to the current skill development program of different institutions.

Acknowledgments

The author is grateful to Late Dr. Sanowar Hossain for his guidance and support in every research work. Thanks to Md. Asauzzaman, President, Bangladesh POUISH for his kind support on training module development and field visit.

REFERENCES

- Chakraborty, T. R., & Hossain, S. (2016). Community Hint on the Conservation of Biodiversity of the Bay of Bengal. In *The Bay of Bengal: A Forgotten Sea. Proceeding of the Symposium on the Bay of Bengal*. Yangoon, Myanmar, 4 February 2016.
- Chakraborty, T. R. (2004). Capacity Building for Coastal Wetlands Conservation: A Field Note. In *Coastal wetlands in Bangladesh, Nature, livelihoods and participation*. Bangladesh POUISH, Dhaka and Ramsar Center Japan.
- DoE. (n.d.). *National Strategy and Action Plan of Bangladesh 2016-2021*. Department of Environment Ministry of Environment and Forests Government of the People's Republic of Bangladesh.
- FAO. (2019). *Ecosystem approach to fisheries management training course (Inland fisheries)* (Volume 1). Handbook for trainees. Rome.
- George, G., Sobhana, K. S., & Gopinath, V. (2024). Marine Biodiversity and Fisheries Environment Management. *Training Manual on Fisheries Management Practices and Techniques*. ICAR-Central Marine Fisheries Research Institute, Kochi.
- Gillette, D. P., Edds, D. R., & Jha, B. R. (2023). Identifying imperilled fish species and potential causes of decline in the Himalaya biodiversity hotspot. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 33(2), 129-143. <https://doi.org/10.1002/aqc.3914>
- Hossain, M. N. (2019). Marine Protected Area Amidst SDG 14: Bangladesh Perspective. *Armed Forces Journal*, 1(1), 97-112.
- Islam, M. M., Shamsuzzaman, M. M., Mozumder, M. M. H., Xiangmin, X., Ming, Y., & Jewel, M. A. S. (2017).

- Exploitation and conservation of coastal and marine fisheries in Bangladesh: Do the fishery laws matter? *Marine Policy*, 76, 143-151.
- Khera, N., & K. Sivakumar, K. (2014). *Compendium of Training Courses on Coastal and Marine Biodiversity and Marine Protected Areas in India*. WII & GIZ, Delhi.
- Rahman, M. A. (2025). *Sea Turtles at Risk, How Communities in Bangladesh are Making a Difference*. Worldfish. www. <https://worldfishcenter.org/blog/sea-turtles-risk-how-communities-bangladesh-are-making-difference>
- Rahman, M. A., Lee, S. G., Molla, M. H. R., Asare, O. E., Megwalu, F. O., Jahan, B., & Shaikh, M. M (2018). Fisheries management and governance in Bangladesh. *MOJ Eco Environ Sci.*, 3(6), 381–385. <https://doi.org/10.15406/mojes.2018.03.00117>
- Sawrey, B., Copsey, J., & Milner-Gulland, E. J. (2019). Evaluating impacts of training in conservation: a case study in Mauritius. *Oryx*, 53(1), 117-125. <https://doi.org/10.1017/S0030605316001691>
- Shamsuzzamn, M. M., Mozumder, M. M. H., Mitu, S. J., Ahamad, A. F., and & Bhyuian, M. S. (2020). The economic contribution of fish and fish trade in Bangladesh. *Aquaculture and Fisheries*, 5(4), 174-181.
- Tora, A. T., Hasan, J. & Shaha, D. C. (2022). Marine fisheries resources in Bangladesh: Present status and future prospects. *Ecology Journal*, 4(2), 179-193.
- Truchet, D. M., Noceti, M. B., Villagrán, D. M., Orazi, M. M., Medrano, M. C., & Buzzi, N. S. (2019). Fishers' ecological knowledge about marine pollution: What can FEK contribute to ecological and conservation studies of a southwestern Atlantic estuary? *Journal of Ethnobiology*, 39, 584-606.
- UNESCO. (2025). *Education and awareness*. Retrieved from <https://www.unesco.org/en/biodiversity/education>