

Article

Fishery-Based Ecotourism in Developing Countries Can Enhance the Social-Ecological Resilience of Coastal Fishers—A Case Study of Bangladesh

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Abstract: The importance of recreational fishing, in many coastal areas and less developed nations, is increasing rapidly. Connecting fisheries to tourism can create innovative tourism products and provide new income sources. The present study is the first to explore the concept of coastal fishery-based ecotourism (FbE) to enhance the social–ecological resilience of coastal fishing communities in a specific tourist spot in Bangladesh. A combination of primary (quantitative and qualitative) and secondary (literature databases) data sources were used in this study. It applied a social–ecological system (SES) and social–ecological resilience (SER) concept to collect quantitative and qualitative data (120 in-depth individual interviews, four focus group discussions, and strengths, weakness, opportunities, and threats-SWOT analyses) and frame their interpretation. The study found that Bangladesh needs to adopt a firm policy to utilize tourism’s potential in national economic development and societal progress. The findings show the considerable potential of the concept that integrates business, education, and an environmental conservation perspective in Bangladesh, specifically for Saint Martin’s Island: 32% of interviewees expressed that increasing employment opportunities and the Gross Domestic Products (GDP) is the primary potential, whereas 31% said it would attract fishing tourists and 23% believed it would develop the local infrastructure and facilities for fishing and tourism. Similarly, most of the respondents (31%) thought that the lack of awareness and promotional activities is the main limitation preventing this initiative from being well accepted. Moreover, based on the findings, specific measures for strengthening the social–ecological resilience of the coastal fishers via FbE at the local level were suggested, including building communal links, developing community infrastructures, revising prevailing rules and regulations, offering alternative means of generating income for fishers during disaster periods, and more active sharing of responsibility between stakeholders and government for the management of FbE. Finally, with its focus on the prospects and challenges of coastal FbE development on Saint Martin’s Island, this article provides a useful reference point for future discourse on similar social and economic strategies. While this study focuses on Bangladesh’s coastal fishing villages, the results are possibly applicable more broadly in similar contexts and developing countries worldwide.

Keywords: coastal fisheries; ecotourism; social–ecological systems; social–ecological resilience; employment; Saint Martin’s Island

1. Introduction

Coastal environments are among the most intensively used regions for supporting the human population, activity, and industry on earth [1]. Coastal fisheries have a strong link to coastal environments and play a crucial role in meeting the basic needs of millions of people worldwide in both developed and developing countries [2]. A coastal fishery is defined as an inshore fishing area where all small-scale catches come from artisanal, subsistence, and recreational fishing [3]. Evolving accounts have affirmed that coastal fisheries are likely to land nearly half the world's seafood, playing a critical role in food security and nutrition, especially for those living in poverty [4]. In terms of employment, coastal fisheries are by far the oceans' largest "employer"—more extensive than industrial fisheries, oil and gas, shipping, and tourism in total [5]. Nearly 90% of the world's 120 million full-time or part-time fishers are believed to derive their livelihood from a coastal fishery [6]. They are estimated to contribute 70% of the total world catch (inland fisheries included), destined primarily for domestic human consumption [7]. Furthermore, some 200–300 million people, many of them women, are projected to be employed in the value chain, mostly through informal arrangements. Therefore, coastal fisheries are a significant but undervalued employment, food security, and income source [8], mainly in the developing world and in rural areas [9].

Coastal fisheries are most critical to developing countries. According to recent estimates, 97% (~36 million) of the world's fishers are in developing countries, and 88% (~107 million) of the world's fishery and fish trade workers are employed in the coastal fisheries in developing countries [10]. Notwithstanding these contributions, the sustainability of global fisheries is a growing concern, and the factors that enable and constrain the responsible management of coastal fisheries remain poorly understood [11]. Meanwhile, coastal fisheries face growing challenges, such as habitat degradation, climate change, limited financial sustainability, defective equipment and infrastructure, and a lack of access to markets [12]. Numerous other threats interplay with these, including competition with industrial fleets, water pollution, the demolition of fish habitats, and an escalating human population and need for land in coastal areas [13]. There is a lack of adequate fishery management mechanisms in place to overcome these challenges. Overall, coastal fisheries' sustainability and economic viability, including coastal fishers' social–ecological resilience, are severely threatened and warrant alternative livelihood approaches and improved governance [14,15].

Worldwide, recreational fisheries have been identified as significant contributors to national economies [16,17]. However, much of the research within this field has taken place in the developed world, where there are high rates of participation and lower reliance on fish stocks for food [18]. Recreational fisheries in the developing world are, on average, less well developed and, therefore, have received less scientific attention [19,20]. Besides, fisheries research has traditionally focused on small-scale artisanal sectors in developing countries due to their poverty alleviation potential [21]. Thus, many of the developing world's recreational fisheries are not well understood, disregarding their economic and environmental impacts [20].

Fishing tourism can be combined with recreational fishing as an integral part of modern culture and an essential part of the global tourism industry [22]. Many tourists are not satisfied with the traditional sun, sand, and sea packages and are interested in experiencing something more authentic. Fishing activities and fishing heritage can be a magnificent attraction in their search. Fishing tourism has received increasing attention in the last decade. It is defined as a set of tourism-related activities carried out by professional fishermen to increase their incomes, promote their profession and socio-cultural heritage, and enhance the sustainable use of marine ecosystems and tourists' access to fishing vessels [23]. The importance of recreational fisheries in many coastal areas and less developed nations is increasing rapidly.

Moreover, recreational anglers' activity can offer resources that contribute to coastal regions' rural development in less developed countries [24]. In most developed or indus-

trialized societies in the temperate zone, recreational fisheries have long represented the primary use of aquatic resources, thus constituting the principal fishing activity in limnetic surface waters [25]. Furthermore, the importance of recreational fishing in many coastal areas and less developed nations is increasing rapidly [26].

Recreational fishing is a socially and economically important use of fisheries' resources in most parts of the world. Participation in recreational fishing has grown because of population growth in developed countries. It has a long history involving tourism in developing countries. Arlinghaus [25] and Weithman [27] comprehensively reviewed the socio-economic and ecological benefits of recreational fishing. These include increased quality of life for the recreational angler and income accrued at the local, regional, and national levels in fishing expenditure-dependent commercial activities (e.g., tackle shops and guide services).

In North America, recreational fishers directly support fisheries management, conservation efforts, and outdoor recreation opportunities by excising taxes, purchasing licenses and stamps, and paying equipment registration fees. Moreover, recreational anglers' activity can provide resources for the rural development of less-developed nations' coastal areas. Kearney [28] suggested that the conservation-conscious recreational fishing community represents one of the most significant potential forces for conserving aquatic biodiversity.

Fisheries-based ecotourism (FbE) combines responsible travel to fishery areas with recreational fishing to conserve the environment and improve local people's lives [29]. Fishing tourism is a very specialized niche market. Recreational fishing ranks as one of the world's most popular activities, with 40 million fishing licenses in the USA alone; sports fishing represents perhaps only 10% of all people who fish as a leisure activity. Furthermore, an even smaller percentage travel overseas for a fishing holiday. The most significant global source market for fishing tourists is the United States. However, to be precise, the majority travel to nearby destinations like the Caribbean and Central America. Australians and New Zealanders are avid anglers and currently represent around 70% of fishing tourism in the Pacific Islands. The United States and the UK/Europe are potentially broader markets for Pacific Island countries. Argentina and Chile also represent new market opportunities. With greater awareness and improved access, there is potential for a small number of South American fishing tourists. In the Mediterranean, fishing tourism is considered a specific strategy to address the short-term losses related to the establishment of Marine Protected Areas (MPAs) and provide an alternative source of income [29].

Recreational fishing trips conducted by fishers and tourists account for a significant part of many countries' tourism business [30]. The tourism sector in Bangladesh is now employing over 1 million people, generating a total value of 8.4 million USD/year [31]. Linking fisheries to tourism can respond to the need to create innovative tourism products and prioritize the enhancement of coastal fishing communities' social-ecological resilience by finding new income sources for profitable and more sustainable coastal fisheries [32–34]. In this regard, one question is whether Bangladesh can be branded as a FbE destination. The present study is the first attempt to explore the concept of FbE in a specific coastal tourist spot in Bangladesh. This investigation may contribute to the understanding of aspects related to the initiative of fishery ecotourism development. The study's findings will also foster FbE by informing policymakers about the potential for FbE, and recommendations made here could be applied in other countries with similar ecological and socio-economic contexts.

Several research activities were conducted regarding the prospects of ecotourism in Bangladesh [35–38]. However, there is a lack of research on the possibility and potentiality of coastal FbE in Bangladesh, including enhancing the coastal fishing communities' social-ecological resilience. To fill this gap, the present research focused on the following objectives, considering Saint Martin's Island as a case study site:

- To describe the present status and potential of FbE on Saint Martin's Island;
- To investigate the social-ecological resilience of the coastal fishing communities on Saint Martin's Island;

- To identify the possible challenges and recommendations for enhancing the social–ecological resilience of fishing communities on Saint Martin’s Island through FbE.

2. Methods

2.1. Bangladesh as a FbE Destination with a Focus on Saint Martin’s Island

Tourism in Bangladesh is not yet fully flourishing; rather, it is a developing industry. With the gradual development of infrastructure facilities and increasing exposition, Bangladesh is quickly emerging as an attractive tourist location [39]. In Bangladesh, in 2018, the direct contribution of travel and tourism to the Gross Domestic Product (GDP) was 4.4%, and this is forecasted to rise to 4.7% of the GDP in 2027 [40]. Notably, the total contribution consists of direct, indirect, and induced contributions. Furthermore, in 2016, travel and tourism directly supported 1,057,000 jobs. This figure is expected to reach 1,138,000 (1.6% of the total employment) in 2027 [39]. Nearly 0.2 million overseas tourists visit the country annually for different purposes. In 2017, this was expected to grow by 11.2%, and the country is anticipating 147,000 international tourist arrivals. By 2027, international tourist arrivals are forecasted to total to 239,000 [40].

Bangladesh’s geographical positioning promotes its exploration as a tourist destination, primarily an ecotourism destination. The country consists of a flat alluvial plain, crisscrossed by three mighty rivers—the Padma, the Meghna, and the Jamuna—and their innumerable tributaries and distributaries [34]. The question is whether there is any significant potential for recreational fishing in Bangladesh, including along the coast. The answer is obvious: of course, there is. There are plenty of opportunities for recreational fishing in Bangladesh. This country is blessed with about 1000 rivers. The Bay of Bengal is one of the 68 fish breeding grounds around the globe. Cox’s Bazar has more than 100 km of sandy beach with lots of fish holes where shore fishing can be enjoyed. Saint Martin’s Island is an excellent spot for a deep-sea angler. The Ganges Mouths of Bangladesh’s southern districts, including the Sundarbans mangrove forest, are magnificent fishing grounds [41].

Bangladesh has a coastline of about 710 km and 121,110 km² of Exclusive Economic Zone (EEZ), characterized by unequally differentiated ecosystems with significant ecological and economic importance and potential [42]. Bangladesh is one of the most suitable fisheries globally, with the largest flooded wetland and the third largest aquatic biodiversity in Asia after China and India. Furthermore, Bangladesh with its rich inland waters and river systems, has significant capture fishery and aquaculture potential. Its favorable geographic position comes with many aquatic species and provides plenty of resources to support fisheries’ potential.

Saint Martin’s Island (Figure 1) is known as a marine paradise and regarded as the most visited destination, an eco-tourism attraction, and the only coral island in Bangladesh [43]. The accommodation options on Saint Martin’s Island are still minimal. For homestay facilities, the localities’ fishers and the local people have arranged some tourist accommodation facilities in their private homes. Around 480–500 people on Saint Martin’s Island are directly connected to tourism activities, including 34 registered tourist guides [43]. Many people are also involved in providing indirect tourism services, such as constructing hotels, motels, or resorts, running rent-a-car businesses, and selling umbrella benches to part-time sea and beach tour operators (mostly students). Students often work as part-time tour operators. Many individuals catch, dry, and sell fish in different parts of the country. Roughly 800–1000 people on Saint Martin’s Island, directly and indirectly, serve the tourism sector. Hence, tourism is now the primary source of income of Saint Martin’s Island [40] and plays a vital role in developing the local people’s lifestyle and providing advantages to the people engaged with this sector.



Figure 1. The scenic beauty of Saint Martin's Island.

2.2. Theoretical Framework

Frameworks are essential because they help analysts to organize diagnostic, descriptive, and prescriptive inquiries [44]. In this study, we used social–ecological systems (SESs) [44] and social–ecological resilience (SER) [45] as our analytical frameworks (Figure 2). We considered recreational fisheries as complex adaptive SESs by focusing on issues that foster an understanding of how recreational fisheries work. By learning how a recreational fishery or FbE functions, it is possible to learn about how humans and their interaction with nature including the consumable products of nature. It is also expected that a resilient ecosystem can support resilient communities and vice versa [46]. For instance, resilient ecosystems' social outcomes are often mediated by several factors, such as the communities' resources, rights, and access to the environment [47]. Ecosystem outcomes are also dependent on social factors, such as tenure within management regimes, markets, and technological factors [48]. Examining this intricate link between social and ecological resilience requires in-depth consideration of social institutions (i.e., the formal and informal rules governing human behavior) and the roles of power and politics in enabling individuals, households, and communities to benefit from ecological resilience [49,50].

Social–Ecological Systems (SESs)—a SES is an ecological system that is intricately linked to and affected by one or more social networks [51]. In other words, in an SES, humans' role is an essential part of any conservation effort due to the positive enhancement of interactions and feedback loops between the ecological and the social sub-system [52]. Recreational fisheries are prime examples of strongly coupled social–ecological systems (SESs) [53–55].

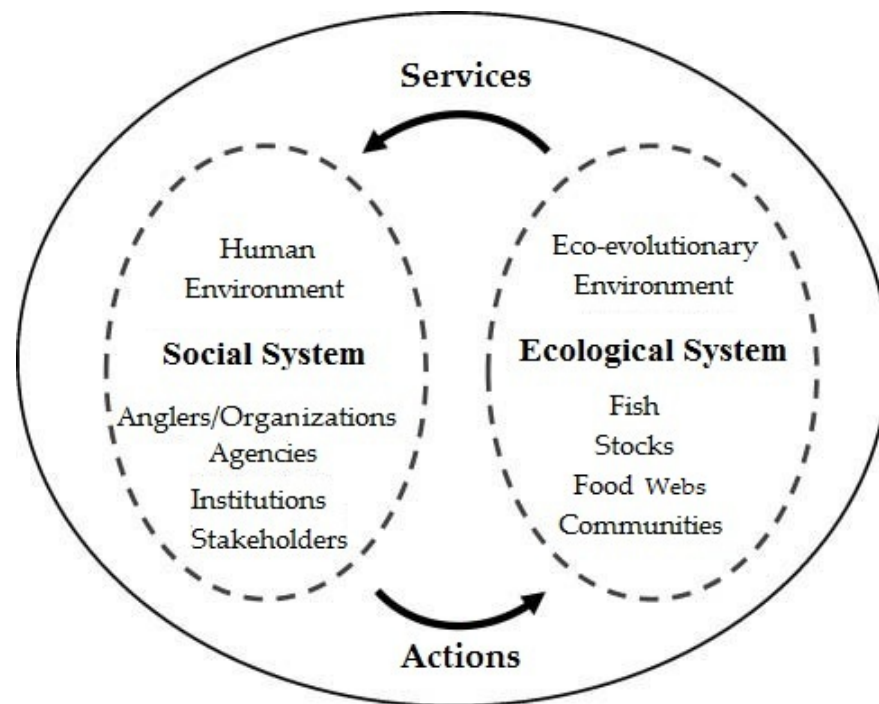


Figure 2. A schematic view of recreational fisheries as SESs (modified from [55]).

The basic framework consists of the social system (human) and ecological systems (aquatic ecosystem). The social system is composed of institutions (existing formal and informal rules), which include traditional fishery regulations and social norms of proper behavior for managers, tourists, and society [56]. Other social components include the actors (i.e., anglers or tourists, decision makers, policy makers, and other stakeholders) and the organizational governance structures developed to steer the system (i.e., governmental management agencies, user organizations, and non-governmental organizations (NGOs)). The ecological system involves macro-scale boundary conditions, the water bodies in each landscape, and the associated biophysical conditions and fish populations.

Social–Ecological Resilience (SER)—research has begun to investigate the resilience of rural communities [57–59] as well as other dimensions of resilience, such as strategies for tourism crisis management [60], frameworks for tourism disaster mitigation [61], post-disaster recovery [62], and weaknesses in the forecasting of crises and disasters affecting the tourism industry [63]. Resilience and sustainability have been investigated in rural Taiwanese tourism communities. The results showed that resilience policies might help rural communities to achieve enhanced resilience and successful sustainability initiatives, making them better off than communities that focus on either resilience or sustainability and not both concurrently [64].

Over the past several decades, resilience theory and ecological resilience [65] have emerged as powerful tools for understanding the systems through which humans and nature interact, known as social–ecological systems [66]. Resilience theory describes how dynamic systems operating at various spatial and temporal scales interact with each other, dampening change, and sometimes accelerating it [67]. Within resilience theory, and based on ecological resilience, “social–ecological resilience” refers to a social–ecological system’s ability to absorb change and disturbance without shifting to a new regime with a different set of processes and structures, that is, without transforming into a new system state [68]. Besides, knowledge of the properties of social–ecological resilience can help to design policies that minimize adverse impacts on people and maximize the sustainability of the goods and services derived from the ecosystem [68].

We anticipate that, beyond providing a professional reading for academics and officials in relevant fields, the present study may ultimately serve to improve both, the lives of

coastal fishers and the ecological resilience of the environment on which their livelihood depends. For this to happen, the human and biological environment's holistic nature must first be recognized (the SES framework). Next, a sort of target direction must be set, according to which any overall claims of "improvement" or "degradation" can be evaluated in context (the SER framework). We developed a questionnaire to collect quantitative and qualitative data from respondents based on the SES and SER frameworks.

2.3. Location and Characteristics of the Study Site

Saint Martin's Island is the only coral island of Bangladesh and an ecotourism destination, located at the southernmost tip of Bangladesh between latitude $20^{\circ}34' - 20^{\circ}39' N$ and longitude $92^{\circ}18' - 92^{\circ}21' E$, separated from the mainland by a channel that is about 9 km wide from Cox's Bazar–Teknaf peninsula and 8 km west off the northwest coast of Myanmar and forms the southernmost part of Bangladesh (Figure 3).

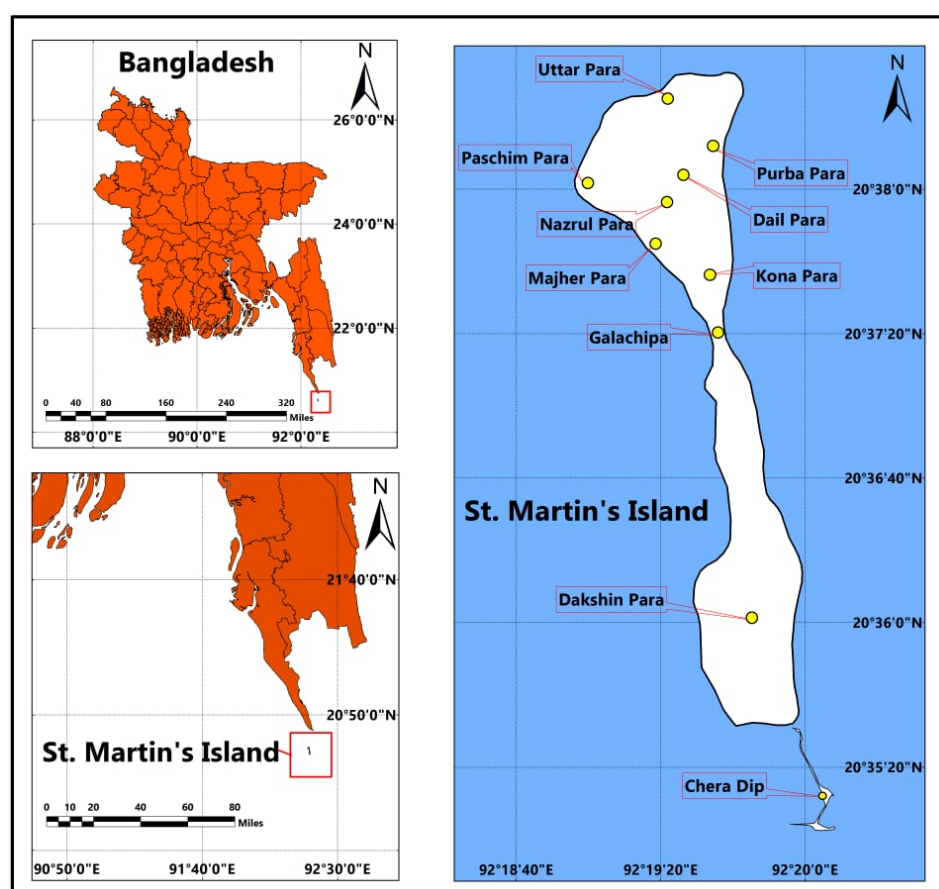


Figure 3. Saint Martin's Island and study areas.

Saint Martin's Island is 8 km² long, situated in the northeastern part of the Bay of Bengal. The island is located on a shallow continental shelf with a maximum depth of 24 m. Alongside the main island, a small adjoining island is further south, separated at high tide, called Chera Dip. Only the central elevated portion of Chera Dip remains dry at high tide. Tourists travel there to see the beauty of the coral island. They arrive early in the morning and return to the main island in the afternoon. Among the locals, this island is known as Narikel Jinjira (Coconut Island). It is an excellent example of the co-occurrence of corals, algae, seaweeds, grasses, and mangroves. However, they are under the threat of extinction due to tourists' enormous pressure and unplanned extraction and uses. So far, 14 species of algae have been recorded on Saint Martin's Island. The island has been declared as an "Ecologically Critical Area" (ECA) to embark on meeting the requirements of the global Convention on Biological Diversity (CBD) [69].

Around 3000 tourists visit daily on average during the peak hours in the tourist season, with the best weather from November to February [70]. Corals and clear blue water attract tourists to this island's charming beauty and clean and tidy marine life. About 90% of the inhabitants of this island live on everyday fishing in the bay. Local people also collect stones and rocks to sell to visitors as souvenirs.

2.4. Investigation Methods

Four fishing villages on Saint Martin's Island were selected: Paschim Para, Dail Para, Uttar Para, and Purba Para (Figure 3). Approximately 5500 people live in these villages. When tourists visit this area in wintertime, fishers temporarily change their professions to boat operators, tourist guides, or hotel and restaurant workers. However, most of them are engaged in fishing during the offseason, including drying fish in the sun.

Both primary and secondary data were collected for the study. The primary data were obtained through mixed methods, including quantitative and qualitative data collection. Mixed methods were used to understand better the connections or contradictions between qualitative and quantitative data. Such methods can also allow the participants to have a strong voice and share their experiences during the research process [71]. These included in-depth individual interviews, focus group discussions (FGDs), and SWOT analyses conducted from July 2018 to March 2019. In-depth interviews are useful when detailed information about the respondents' thoughts and behaviors are sought, or current issues are to be explored in depth [72]. However, a pilot study was carried out in the study areas to develop the questionnaires for the interviews and define the work's scope and nature. The focus group discussion was arranged to integrate the stakeholders and their ideas on a common platform. A SWOT analysis is essentially a brainstorming session on the key variables that affect a sector's performance [73]. Hence, the SWOT analysis technique was used to explain the current constraints and future fishery-based tourism potentials on Saint Martin's Island.

By using a semi-structured questionnaire (see the supplementary files), a total of 120 in-depth individual interviews (with 37 fishers, 34 tourists, 27 tour operators, and 22 other stakeholders, including boatmen, local government officers, law enforcement agencies, hotel owners, and fish traders) and four focus group discussions (10–12 participants in each FGD) was conducted. Some tour operators and government officials were interviewed in Cox's Bazar as they were not available on the island.

Purposive and snowballing sampling strategies were used to select the interview respondents. The "snowballing" sampling method was used to identify potential fishers to interview because of the diverse group of people engaged in FbE [74]. A purposive sampling approach was employed to interview more knowledgeable fishers and other stakeholders [75]. The interview guidelines were semi-structured, but open-ended discussions were allowed. To obtain quantitative data, we gathered information from the respondents. The questions were related to the respondents' literacy and whether they understood ecotourism, FbE, and the possibility of FbE on Saint Martin's Island. As an unfamiliar concept to be tested, the interviewees were given an idea of fishing tourism at the beginning of the interview to support a better conversation. The interviewees were asked about the present status and resources of ecotourism in Bangladesh, considering the coastal, marine, and fresh waters of Bangladesh and the forests with economic returns. They were further asked about the potential of fishing tourism, the possible challenges to implementing fishery-based tourism on Saint Martin's Island, and the conditions needed to build and enhance the local fishing communities' resilience on Saint Martin's Island. Furthermore, they were asked what types of initiatives the government and other agencies should take to overcome the challenges (see Supplementary Material File S1).

Before each interview, the respondents were informed about the study and assured their ethical principles, including their anonymity and confidentiality rights. Furthermore, we shared our intention behind the data collection and obtained verbal informed consent. Prior permission was obtained for all recordings of interviews and photographic docu-

mentation. Participation in the research was entirely voluntary. All the participants were informed of their right to withdraw from the study at any stage. Besides, we obtained approval from the participants to quote their interviews if appropriate and related to the study. The interviews were carried in local dialects and languages (Bengali). Each interview lasted an average of one hour.

The qualitative data analysis included three steps: preparing and organizing the data for analysis, reducing the data into themes, and finally representing the data in tables or as part of a discussion. The qualitative data were analyzed using Microsoft Excel. After transcribing the qualitative data, the contents were interpreted, and themes were developed and classified into different explanatory variables. For the quantitative data analysis, the data were stored, interpreted, and then digitized for analysis. The data were analyzed using Excel and SPSS, and the results were presented in tabular form.

Secondary data were gathered from multiple scholarly articles and related literature through an online search. To identify relevant publications, the search string used was tourism OR ecotourism *fishing tourism OR recreational fishing *potentials and challenges of ecotourism OR potentials and challenges of recreational fishing, *potentials of ecotourism in Bangladesh OR potentials of angling in Bangladesh* challenges of ecotourism in Bangladesh OR challenges of recreational fishing in Bangladesh AND tourism and ecotourism policies in Bangladesh OR resilience, social resilience, and ecological resilience in the article title, abstract, or keywords or only in the abstract, depending on the searching options available on the bibliographic databases. All gathered data were comprehensively reviewed and synthesized, and the relevant information was used.

3. Results and Discussion

3.1. Present Status of Tourism, Ecotourism, and FbE on Saint Martin's Island, Bangladesh (Secondary Source Findings)

Historically, Bangladesh has been an attractive destination for various categories of tourists. Several studies have focused on the potential of tourism and ecotourism in Bangladesh. The economic benefit of tourism is seen to reduce local communities' dependence on natural resources [76]. Ecotourism's potentiality and sustainability in Bangladesh largely depend on visitors' steady arrival in the destination without harming the natural resources [77]. It is vital to ensure the visitors' satisfaction. Simultaneously, the natural areas should not be degraded, and the environment must remain sound and free from pollution. However, local people's benefits must be considered in terms of employment generation, business opportunities, education, infrastructure, and superstructure development [38]. To make Bangladesh a suitable ecotourism destination, political stability, an optimistic government, local community participation, and smooth and effective promotional campaigns at the local and international levels are necessary [78]. It is a matter of hope that, recently, the Government of Bangladesh has listed tourism as an essential sector [79]. However, in Bangladesh, there is no effective national tourism plan to guide entrepreneurs and investors. Besides, there is a severe lack of management in this sector at the national, regional, and local levels [80]. Thus, Bangladesh needs to adopt a firm policy to utilize tourism's potential in national economic development and societal progress. Bangladesh is yet to make any concerted effort to exploit its tourism potential effectively. However, in the recent period, there have been some awareness development campaigns by public and private sectors regarding the possibility of tourism in the country [81].

Every year, Saint Martin's Island attracts many tourists from all over the world due to its precious marine life. The island has seen an increasing number of domestic tourists as well. Tourists often visit it for activities like scuba diving and wild fishing [82]. Notably, Chera Dip (Figure 1) is the most famous for adventure because it provides scuba diving facilities. Even though Saint Martin's Island plays a significant role in the tourism industry, the accommodation facilities in that area are somewhat limited, affecting the potential number of tourists [83].

3.2. Quantitative Interview Findings

3.2.1. Stakeholders' Knowledge of Ecotourism and FbE

It was evident from the interviews that most respondents lack knowledge about ecotourism (60%) and FbE (75%). However, when described by the interviewer, the respondents understood the possibility (75%) or potential (92%) of FbE in Bangladesh (Table 1).

Table 1. Stakeholders' knowledge of ecotourism and fishery-based ecotourism (FbE).

No.	Category	Total Number	Literacy (Number)		Understood Ecotourism		Understood FbE		Possibility of FbE	
			Yes	No	Yes	No	Yes	No	Yes	No
1	Fishers	37	5	32	3	34	6	31	36	1
2	Boatman	7	0	7	1	6	0	7	6	1
3	Tourist	34	34	0	17	17	10	24	30	4
4	Local Government	2	2	0	2	0	2	0	2	0
5	Tour Operator	24	24	0	19	5	6	18	23	1
6	Law Enforcement	6	6		5	1	2	4	4	2
7	Hotel Businessman	5	5		1	4	2	3	4	1
8	Fish Business	5	2	3		5	2	3	5	0
9	Total	120	78	39	47	70	30	87	110	10
10	Percentage (%)	100%	65%	35%	40%	60%	25%	75%	92%	8%

3.2.2. Potential, Limitations, and Mitigation Measures Proposed by the Respondents

When asked about the potential, limitations, challenges, and mitigation, or how to overcome this practice's difficulties, the respondents highlighted the points reported in Table 2. Out of the interviewees, 32% expressed that increasing the employment opportunities and GDP is the topmost potential while 31% said it would attract fishing tourists, and 23% believed that it would develop the local infrastructure and facilities for fishing and tourists. Similarly, most of the respondents (31%) thought that the lack of awareness and promotional activities is the main limitation preventing this initiative from being well accepted.

Table 2. Potential, limitations, and mitigation measures proposed by the respondents.

Potential	Limitations	Mitigation and Recommendations
Increase employment and GDP (32%)	Lack of awareness and promotional activities (31%)	Increase promotional activities and establish FbE infrastructure (30%)
Attract fishing tourists (31%)	Scarcity of proper infrastructure facilities, boat facilities, gears, and high fishing cost and boat fares (24%)	Increase boat facilities, improve boat structure, and reduce boat fares (23%)
Increase FbE infrastructures and facilities (23%)	Unplanned and uncontrolled coastal development and management (17%)	Need proper planning and an integrated coastal management plan for Saint Martin's Island (20%)
Increase security around the island (12%)	Cooperation defects among stakeholders, local people, and authority (11%)	Increase cooperation among multiple groups and stakeholders (local people, fishers, authorities, governance, and businessmen) (10%)
Increase literacy and change lifestyle (9%)	Lack of guidelines, training, and education (10%)	Increase guidelines, training, and proper education (10%)
Promote Saint Martin's Island as a unique place ("a must-see")	Weak security and safety provisions for FbE (7%)	Ensure tourists' security and safety when traveling (6%)

3.2.3. SWOT Analysis of FbE

The strengths, weaknesses, opportunities, and threats of FbE on Saint Martin's Island are described in Table 3 based on the respondents' perceptions obtained during the interviews and FGDs.

Table 3. SWOT analysis of FbE on Saint Martin's Island.

Strengths		Weaknesses	
<ul style="list-style-type: none"> ➤ Various natural resources on Saint Martin's Island for attracting tourists in the winter season ➤ High attraction ability in tourist society ➤ Suitable location surrounded by blue ocean ➤ Good transportation availability ➤ Suitable hotel and restaurant services for tourists ➤ Sound security system for tourists ➤ Easy to reach the market ➤ Tourist-friendly local people ➤ FbE Potential ➤ Potential for establishing a "Marine Fisheries Museum" 	<ul style="list-style-type: none"> ➤ Lack of FbE knowledge and awareness ➤ Lack of proper infrastructures and facilities (e.g., tourist fishing access) ➤ Lack of suitable fishing boats, life jackets, and kitchen support ➤ Cooperation defects among stakeholders, local people, and authorities ➤ Limited capacity and lack of a training center for qualified tourism personnel ➤ Lack of FbE promotion ➤ Lack of logistical support ➤ Lack of financial sources ➤ Mismanagement of ecotourism in planning, unsustainable development, and marketing 		
Opportunities		Threats	
<ul style="list-style-type: none"> ➤ Natural and FbE attractions for responding to new demands of tourists ➤ Increase the net income of fishers and the GDP ➤ Creating new ecotourism markets via present potential in fisheries-based adventures and sports ➤ Having regular fisheries-based tours ➤ Increasing the quality of tourism services and facilities ➤ Increasing the island's security ➤ Developing management abilities in the tourism industry ➤ Planning for new projects and obtaining reasonable budgetary and logistic support for FbE 	<ul style="list-style-type: none"> ➤ Natural disasters, like cyclones, tsunami, and earthquakes ➤ Unpredictable conflict and disagreement from locals or government ➤ Weakness in the governmental organization for using sustainable methods in ecotourism management ➤ Weak governance and mismanagement will increase environmental pollution and biodiversity loss ➤ unplanned government policy 		

3.3. Qualitative Interview Findings

The qualitative interviews' findings indicated both prospects for and constraints on the implementation of FbE on Saint Martin's Island. Referring to fishery-based tourism as a new concept in the Bangladeshi context, the head of a tourism organization in Cox's Bazar stated: "Fishery-based tourism exists in Bangladesh on a limited scale. There are some remote tour operators and angling clubs that arrange fishing trips on the rivers." Furthermore, fishery-based tourism's potential and how Saint Martin's Island can be used in fishing-related tourism were discussed during the interviews with different stakeholders. The discussions are summarized below.

3.3.1. Challenges of FbE

In Paschim Para, a tour operator stated his ideas about FbE on Saint Martin's Island during the interviews as follows: "You know, there is no such type of ecotourism in this area. So, introducing FbE in this locality needs lots of hard work, however, with the help of different agencies, such as governmental departments, including tourism authority, law and enforcement agencies, and private tour operators. There is no specific fishing zone for tourists interested in fishing, seeing coral, underwater life. Our people came to enjoy the sea. They do not know what FbE is. Some eco-friendly tourism control infrastructures should be established in this area. Fishers should be awarded for FbE." A local fisher (Dail Para) expressed his views about the challenges and possibilities of FbE: "Yes, FbE is possible. If it can be set up in this area, local anglers, fishers will be happy by getting

extra income. However, tourists are afraid of us. Sometimes they do not want to go with us. Sometimes they do not have enough money to arrange FbE. Sometimes they came here and stayed only for one night.”

We also interviewed tourists about the challenges of FbE, and a tourist said, “Well, it would be a good idea to get new experience by catching fresh fish and making a barbeque with it. However, there are not enough boats for it. They are not well furnished also. They are small for fishing. Besides, safety and security must be ensured in the fishing boat. Hence, tourists will be eager to spend money on that.”

3.3.2. Management of FbE

A local student (Purba Para) expressed his views about FbE as follows: “Actually, I do not know about it (FbE). Nevertheless, what you are saying, it will be very interesting and fun for tourists. There is not such an arrangement on this island. If it can be introduced to people and if they get extra money, they will start activities. Students do not go to school in tourist season; they can work as a tour guide, hotel boy, receptionist, and crew in a boat.” In addition, a local businessman gave his opinion about the management of FbE:

“The government is not interested in building new buildings here. The government does not allow tourists to stay here. Saint Martin’s Island is declared a Marine Protected Area (MPA), so people cannot stay more than a day. So how will the FbE exist? However, it is an excellent idea. There are many places on this island to fish. There needs to be a proper management to manage it. We need some infrastructures to control it. We need some promotional awareness for local people and tourists. Local people should be encouraged for FbE. There is one problem: tourists do not want to spend money on it; they come here to see coral rocks and blue water.”

A boatman from Uttar Para, Saint Martin’s Island, stated his opinion about integrating fishery operations and tourism:

“I have been working on a fishing boat for the last 20 years. I have not heard about fishery tourism before. This is a new thing for me, and I would not have imagined something like FbE could be carried out on Saint Martin’s Island. I have seen people come here to see the sea and corals’ beauty from other parts of the country and abroad. However, there is a variety of fish found on the island. In my opinion, there is much potential for integrating fishery activities and tourism in this coral island. Such initiatives may attract more tourists to increase economic activity and ultimately bring prosperity to the local community. Undoubtedly, fishing tourism would simply supplement our primary income (from fishing) rather than replace it.”

A person from a law enforcement agency stated his concern about FbE as follows:

“Well, indeed, it is an excellent initiative. It will create new employment opportunities, hence reducing out-migration and poverty. The locals can know about the outside world without leaving their homes, while their visitors can learn a great deal about a distinctive culture. Furthermore, local communities benefit from tourism by contributing to social infrastructure improvements, such as schools, libraries, and health centers. However, we should also be aware of social conflicts, including the law and enforcement that might arise, and consider possible ways to mitigate them beforehand.”

During the interviews, a hotel and restaurant owner from Saint Martin’s Island added: “There is something special to the tourists about cooking up the freshest possible kinds of seafood, right on the boat while still out on the sea. So, one thing that can be arranged as part of FbE is these sorts of fishing and dining cruises, for local Bangladeshi tourists and international tourists.”

3.3.3. Social–Ecological Resilience of the Fishing Communities

An environmental specialist from the Department of Environment, Cox's Bazar, Bangladesh, stated that FbE could be an option to enhance the resilience of the coastal fishing communities. He further added:

“For tourists, this means being treated to delicious, high-quality seafood while helping to build economic and environmental resilience in the communities where they choose vacation. While tourism can help financially support and enhance the local fishers' social resilience, the ecological impacts of tourism can also threaten marine systems. Such impacts include water pollution and habitat destruction associated with coastal development and excessive visitor use. In such a case, steps should be taken by the local communities with the help of the government to minimize the harmful impacts of FbE tourism to a minimum level so that ecological resilience can be enhanced.”

An academic from the Faculty of Marine Science and Fisheries, University of Chittagong, expressed his views about FbE and its role in enhancing the social–ecological resilience of the coastal fishing communities as follows:

“You know, recreational fishing, diving, surfing, swimming, and boating are activities that tourists are more likely to enjoy in an ecologically healthy and responsibly managed location. An abundance of fish to catch makes for a more productive sportfishing. Scuba divers will appreciate and flock to well-preserved shipwrecks they can explore, while surfers and beachgoers prefer waters free of pollution and harmful algal blooms. Visitors seeking coastal destinations expect picturesque open horizons to gaze at from land or sea. These positive experiences are what keep tourists coming. I think Saint Martin's Island has all the above-stated things to attract tourists for FbE from Bangladesh and other parts of the world. Moreover, local fishers will have the possibility to enhance their livelihoods with alternative income sources. Such an option may enhance fishers' social resilience, and fishers will be encouraged to keep the island's ecological environment free from pollution and protect the island's biodiversity. Finally, the fishing communities' social resilience and the ecological resilience of the island will be enhanced.”

A conservationist expressed his views about the potential of FbE on Saint Martin's Island as a Marine Protected Area (MPA). He added:

“MPAs conserve some of the most beautiful and biologically diverse places on our planet. There are lots of benefits that MPAs provide to marine systems and human communities: they can conserve biodiversity, protect natural or cultural heritage, enhance fisheries' production, provide reference areas for research, and promote ocean literacy. MPAs can also provide essential ecosystem services, such as when protected coral reefs dissipate wave action and reduce shoreline erosion, protecting coastal properties. In this way, individual MPAs and especially well-designed MPA networks contribute to increased system resilience in the face of other stressors, whether ecological or socio-economic. Although the stressors associated with tourism can pose serious threats to marine and coastal environments, engagement with the tourism industry also provides a severe for MPA managers to raise their sites' visibility and share conservation priorities.”

During the FGDs, local fishers from Saint Martin' Island summarized the importance of introducing FbE and how it will enhance their social resilience and improve the island's ecological resilience. They mentioned:

“We cannot think of a single day without fishing. Fishing is our life and our pride. If we fail to go fishing even for a day, we feel suffocated. We just want to live a simple life; we need only to wear simple clothes, eat rice and have a shelter to sleep. However, we fail to manage our minimum needs, though we work hard to

catch fish during the dark of the night, scorching daytime, even in bad weather. You know, to fish in the sea we need boats, nets, and other things. We are very poor, and we cannot afford money to buy fishing equipment. Hence, we take a loan from the local money lenders with a high-interest rate that traps us in a debt cycle. We want to get rid of poverty; we want to get rid of the debt cycle. There are lots of tourists who come to visit this island all year round. The fishery-based tourism that you discussed would be a good initiative for us. It will undoubtedly be an alternative income source for us. We can get a fair price for our fish catch and can pay back the loan. However, the government should take initiatives to help us and to promote fishery-based tourism on this island.”

While discussing what resilience is in the eyes of local fishers, they said, “You know, if we can go for fish and can get a good price for the fish and can lead a smooth life together with our family members, then we are happy, and we are resilient. If we are resilient, we will not go for illegal fishing, will not destroy the biodiversity of the island; on the contrary, it will help to enhance the ecological resilience of the whole island.”

Another elderly fisher pointed out one vital issue during the interviews about the island’s poor infrastructure and facilities. He said:

“We know that the poor infrastructure has direct implications for our fishers’ livelihoods on this island. We do not have electricity and do not have any cold storage facility on this island. The nearest big fish market is far away from here, and it is expensive to try to transport our catch to other places. We must sell the fish to the local agents, and they fix the price. So, we do not get a fair price for the fish. If the government would take the initiative to set up cold storage facilities and arrange safe and convenient sea transportation, we could sell the fish at a higher price and lead a resilient life.”

During the FGDs, all the respondents agreed on one issue: the protection of the island’s natural environment and its ecological resilience:

“We view Saint Martin’s Island as a nature island. So, we need to keep the environment clean, and we want not to pollute it and not cut down the trees and so on. We want to work with our environment, not destroy it, conserving it, so it is resilient for the future. We also understand the need for controlled infrastructure development and limits to growth, which has significant tourism implications. We request locals, the government, and private organizations to develop something at a standard—guest houses or hotels, restaurants, amusement facilities—that can continue to bring persons and maintain tourism and keep our natural resources.”

3.3.4. Fishery-Based Ecotourism as an SES

The concept of social–ecological systems (SESs) has emerged to make the connections between the human and the ecological components of environments more explicit and focus on the feedback mechanisms that couple the two [84]. A schematic representation of an SES shows the ecological component, the social component, and the interphase where links and feedback mechanisms operate. Of critical importance is managing the feedback (the arrows in the middle—Figure 2), which leads to actions and interventions or affects ecosystem services. Feedback is system-specific and can occur between anglers and fishes, anglers and anglers, anglers and managers, fishery stakeholders, and other non-fishery sectors (in analogy to Figure 2). Based on the above discussion, FbE on Saint Martin’s Island includes a social component (human), an ecological component (the natural resources of the island, including the aquatic system), and an interphase (stakeholders’ interests and money lenders’ or middle-men’s roles) through which they are linked in mutual interaction. Hence, FbE on Saint Martin’s Island can be defined as an SES (Figure 2). In this study, we applied a SES approach to improving the FbE understanding in a developing world. FbE should be understood and managed according to its unique social and ecological

traits to achieve ecotourism goals, such as the provision of sustainable local employment opportunities, the empowerment of local communities, and the provision of high-quality tourism activities, and the conservation of natural resources [85].

3.3.5. Enhancing the Social–Ecological Resilience of Coastal Fishing Communities through FbE

Generally, it is assumed that FbE efforts will increase local people's economic well-being and enhance the resilience of the rural economy. Community resilience is ambiguous, nuanced, and contextual but usually focuses on return or recovery time [86]. From community focus groups to national government-commissioned projects, attempts have been made on various scales to identify dimensions of community resilience [87]. Furthermore, community resilience examples cover several dimensions, including social action, collective resource engagement, and environmental health [87]. In the context of tourism development, tourism should be thought of as a complex, dynamic, and non-linear system [88]. According to resilience theory and its tourism application, there are four domains of sustainability—social (e.g., social networks), governance (e.g., local control), economic (e.g., prevention of leakage), and ecological (e.g., controlled infrastructure development) [57].

In developing countries, recreational fisheries have been investigated as an alternative livelihood strategy through ecotourism to generate revenue for local communities (e.g., island nations in the Pacific; [89]). They have also been studied as a conservation initiative and economic incentive to protect fish species and habitat in developing countries by potentially earning revenue from non-destructive activities, such as catch-and-release angling tourism (e.g., the taimen (*Hucho taimen*) fishery in Mongolia and the mahseer (*Tor spp.*) fishery in India [90]). However, the growth of the recreational fishing sector in the developing world will not occur without the potential for negative consequences. Overfishing, population- and ecosystem-level impacts via directional selection, stocking, habitat loss, and the introduction of invasive species have all been identified as potential drivers of ecological change because of recreational fishing practices [91]. In contrast, social conflict within and among sectors has been documented in numerous studies as harming fisheries' social–ecological system [92].

The resilience of the fishing community (as a social unit) and individual community members are tightly linked to the overall fishery SES [93]. The sustainability of the coastal fisheries in developing countries is at risk through over-exploitation, non-compliance with regulations, and conflicts over resource use. To avoid such a situation and sustain the coastal fisheries' natural resilience, it is essential to enhance social resilience [94]. The present study makes some recommendations that can enhance both the social and the ecological resilience of coastal fishing communities through FbE.

3.3.6. Recommendations

To set up sustainable FbE in Bangladesh, a carefully planned management strategy is needed. Through proper guidelines, it is possible to start FbE in practice to make the aquatic ecosystems and adjacent landmass a driver of Bangladesh's national economy [95]. The present study's results reveal that assimilation between fisheries and tourism can expand the potential of providing jobs for local communities, especially fishers, which can become more involved in the tourism sector. A related study was conducted in developed countries [96]. Based on literature studies, observation, and interviews with relevant stakeholders, this study's analysis identified the following possible recommendations to develop the integration of fisheries and tourism on Saint Martin's Island:

- Since people from Saint Martin's Island are friendly, and mostly believe in hospitality, they are likely to utilize an opportunity to increase their family's income and accept a tourism development role. Besides, fish landing and fish processing activities are appealing to develop as part of the travel package. Such things can be part of FbE activity trip packages on Saint Martin's Island.

- Coastal fishers can offer tourists services using their specific skills and equipment (e.g., acting as guides along the coast or taking people out on their boats to watch the corals). The fishing activity itself may also be a source of extra income as tourists may be willing to pay for the opportunity to accompany fishers at work. Some fishers may even be able to offer accommodation in traditional fishing cottages as an added activity.
- From a real tourism standpoint, there was a strong interest in financial and human capacity-building mechanisms at the community level. The lack of start-up finances and human capital is recognized as a barrier to successful community-based tourism initiatives [97]. Hence, an influx of money must be available for the local fishers, particularly at the beginning of the community projects, to boost the initiatives and promote local support. The government should provide direct monetary help for the infrastructure development on Saint Martin's Island. In addition, positive economic growth through increased revenue streams and locally controlled development tend to increase resilience [98].
- Tourism generated through MPAs can make protected areas more attractive to local communities and have increased their acceptance in places like the Caribbean [99]. While tourism can help to support MPAs financially, tourism's ecological impacts can also threaten marine systems within protected areas. Such impacts include water pollution and habitat destruction associated with coastal development and excessive visitor use. Hence, we also considered the vital role that MPAs can play in preserving coral reefs and other ecosystems, leading to greater resilience in the face of the environmental and economic change due to FbE on Saint Martin's Island.
- We suggest addressing visitor impacts; managers can use targeted public outreach programs to help educate visitors and tour operators about best practices and environmentally friendly behavior.
- For tourists, seafood is an essential local culinary attraction. There is a high demand for local seafood among tourists visiting the island. Furthermore, restaurants try to buy fresh and local seafood as much as possible. Proper management of fish and kitchen waste needs to be assured.
- Entrepreneurs and infrastructure developers may explore avenues to invest in building hotels, resorts, and recreational centers on Saint Martin's Island.
- Non-governmental organizations (NGOs) should take the lead to conduct empowerment activities on tourism matters at the local level and can help with tourism promotion.
- Saint Martin's Island should be made more easily accessible by introducing a public transportation system. The promotion of transportation services should be carried out in cooperation between private and government tourism and transportation organizations.
- The security of the visitors should be given priority on the island. To save the island from pollution, there must be a guideline for tourists, and mass awareness is essential.
- To introduce Saint Martin's Island as an FbE location, it is essential to advertise through mass media, including newspapers, television, and various social media. It would be good to bring water skiing and other sporting facilities on the island to attract more tourists.
- The government should develop an integrated network for fostering FbE to generate employment in the country and add value to the gross domestic product that will enhance relevant private sector entities (fishers, boatmen, tour operators, accommodation providers, and transport providers). This must consider local people's interests concerning employment generation, business opportunities, education, and infrastructure development. This is also of primary importance for understanding how tourism and fisheries are connected and operated.
- To strengthen social-ecological resilience at the community level, we suggest specific measures, including building community networks, developing community infrastructures, updating existing rules and regulations, providing alternative means of generating income for fishers during crisis periods (e.g., after natural hazards like

cyclones and floods), and sharing the responsibility for the management of FbE more actively between stakeholders and the government.

4. Conclusions

The present study has provided baseline information across the studied communities on Saint Martin's Island that guides both a collective and an individual community standpoint in developing mechanisms to enhance both the tourism commodities and the resilience of these tourism-dependent populations. The FbE concept has already been an accessible tourism business in many developed countries. At the same time, it is still a new concept for the tourism industry in many developing countries, like Bangladesh.

FbE in Bangladesh requires full attention to be paid to the socio-economic and environmental impacts and minimize the adverse effects on fisheries and fishery products. If it is well planned and carried out accordingly, FbE could provide practical means to contribute to the implementation of the Sustainable Development Goals (SDGs) in Bangladesh. Moreover, this practice will achieve the objectives of the SDGs by balancing social, economic, and environmental sustainability with a focus on SDG 1 (poverty alleviation), SDG 2 (food security), SDG 3 (healthy life and well-being), SDG 8 (sustainable economic growth), SDG 12 (sustainable consumption and production), and SDG 14 (sustainable use of the oceans and marine resources). FbE can be implemented effectively as recreational fishery tourism and can be managed as a practical alternative livelihood strategy that can enhance fishing communities' social-ecological resilience. However, the existing theory and the synthesis of respondents' perspectives presented in this study on Saint Martin's Island may support the development of responsible tourism connected to fisheries in other parts of Bangladesh.

The present study was based on literature reviews and in-country interviews. The status of tourism, the potential for FbE, the challenges, and possible ways to enhance coastal fishers' social-ecological resilience through FbE were described. The findings of this study can be generalized after considering certain limitations. We considered only published articles and a limited number of interviews with possible stakeholders; while our research strove to be objective, it is not comprehensive. We did not generate enough primary data to justify drawing broad scientific conclusions on these matters, nor is there yet enough secondary source literature available to draw definitive conclusions regarding enhancing coastal fishers' social-ecological resilience via FbE.

Further research is necessary to develop a FbE framework and identify how co-management systems could enhance coastal fishing communities' social-ecological resilience via FbE on Saint Martin's Island. The growth of recreational fisheries in developing countries is likely to increase conflict related to competition, access, socio-demographic differences, and governance issues. Hence, research is needed to successfully mitigate or resolve social conflict among stakeholders of the FbE, and that will be a crucial component of aquatic stewardship in developing recreational fisheries. Although this study focuses on Bangladesh's coastal fishing villages, the results are potentially applicable more broadly to locations with a similar tropical context.

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