



Research Project

The Effects of the Fishing Ban on the Socioeconomic Conditions of Hilsa Fishers in Barishal District

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The Effects of the Fishing Ban on the Socioeconomic Conditions of Hilsa Fishers in Barishal: An Economic Analysis.

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Introduction:

The Hilsa (*Tenualosa ilisha*) serves as the national fish of Bangladesh and plays a crucial role in the nation's fisheries economy. It is a major contributor to export earnings and holds a significant place in the cultural and culinary traditions of the country. Nevertheless, the sustainability of Hilsa fisheries faces challenges from overfishing, habitat loss, and illegal fishing activities. To address these issues, the Government of Bangladesh has enacted seasonal fishing bans designed to safeguard spawning and juvenile development phases. These measures are intended to promote long-term sustainability and support the livelihoods that rely on this essential resource.

While the fishing ban is essential for conservation, it has profound implications for the socioeconomic status of the fishers, particularly those residing in Barishal—a region heavily dependent on Hilsa fishing. In the ban period, fishers often experience income loss, food insecurity, and increased indebtedness, raising questions about the adequacy of compensatory mechanisms and alternative livelihood options.

This study investigates the economic and social impacts of the fishing ban on Hilsa fishers in Barishal, focusing on income changes, household well-being, and the effectiveness of government support systems. By analyzing these dynamics, the research provides insights into balancing conservation goals with socioeconomic sustainability, contributing to the broader discourse on natural resource management in developing economies.

The Hilsa fish, a key resource in Bangladesh's economy, plays a dual role as an essential livelihood source for thousands of fisher households and as a vital component of the national GDP. Hilsa accounts for 12% of the country's total fish production, with Barishal being one of the major fishing hubs. Recognizing its declining availability due to overfishing and environmental pressures, the Government of Bangladesh introduced seasonal fishing bans to protect spawning periods and juvenile Hilsa, ensuring sustainability for future generations.

While these bans have achieved ecological success, their implications for the social and economic well-being of the fishers remain underexplored. For the fishers in Barishal, the fishing ban disrupts income flows, pushing families into cycles of poverty and debt. Compensatory measures, such as rice distributions and cash assistance, have been introduced but often fall short of meeting the community's needs. These bans, while necessary for resource conservation, highlight a fundamental trade-off: ecological preservation versus immediate livelihood security.

This research explores how seasonal fishing bans impact the income, food security, and overall well-being of Hilsa fishers in Barishal. It also examines whether current policies adequately address these challenges and proposes strategies for balancing sustainability with economic equity.

Relevant JEL Classifications:

1. **Q22 - Renewable Resources and Conservation: Fisheries**
 - Directly relates to your focus on fishing bans and sustainable practices for Hilsa fish.
2. **Q56 - Environmental Economics: Environment and Development; Sustainability; Environmental Accounts and Accounting**
 - Covers the environmental sustainability aspect of fishing bans and the implications for resource management.
3. **O13 - Economic Development: Agriculture; Natural Resources; Energy; Environment; Other Primary Products**
 - Relevant for examining the socioeconomic impact on local fishers as a part of economic development.
4. **I32 - Welfare, Well-Being, and Poverty**
 - Relates to analyzing the welfare and socioeconomic changes in fishers' lifestyles due to the bans.
5. **Q01 - Sustainable Development**
 - Highlights the overarching theme of balancing resource sustainability and livelihoods.
6. **J43 - Agricultural Labor**
 - Applies if your paper explores the labor dynamics within fishing communities.

Literature Review:

The hilsa fishing community in Bangladesh primarily consists of fishers who rely on hilsa shad for their livelihood. The fishing ban has led to positive socioeconomic impacts, encouraging alternative livelihoods and reducing fishing pressure while supporting long-term conservation efforts. Semi-structured questionnaires for data collection from fishers. Focus Group Discussions and Crosscheck Interviews for additional information. (YASMIN et al., 2023)

The Hilsa fishing community in Bangladesh is significant, with approximately 447,451 fishermen involved. Hilsa fishery plays a crucial role in the national economy and the socioeconomics of these communities, particularly in regions like Barishal Division. Survey of twelve landing centers for Jatka catching. Interviews with boat owners, crews, and fishermen. (Khanom et al., 2022)

The hilsa fishing community in Bangladesh, particularly along the Meghna Riverbank, faces extreme poverty, financial instability, and inadequate access to healthcare and education, relying solely on fishing for income while contending with exploitation and environmental challenges. Household surveys, fishing activity surveys, interviews, observations, problem analysis. Focus group discussions, key informant interviews for comprehensive information gathering. (Mahdi et al., 2023)

This study examines the effectiveness of Bangladesh's National Fisheries Policy 1998, aimed at enhancing production, alleviating poverty, and maintaining ecological balance. Despite its long implementation, the policy has not sufficiently addressed challenges like overexploitation in open-access fisheries. Key issues include outdated regulations, weak enforcement, poor governance, and limited community involvement. (Shamsuzzaman et al., 2022)

The Hilsa fishing community in Bangladesh is vulnerable to climate change, facing threats to biodiversity and fish stocks. Adaptation strategies include social relationships, alternative livelihoods, aquaculture, and enhancing ecological knowledge to cope with these challenges effectively. Examines adaptation strategies for small-scale Hilsa fishers in Bangladesh. Identifies social, economic, and ecological responses to climate change impacts. (Mozumder et al., 2018)

The study focuses on fishing settlements along the Surma River, Hakaluki Haor, and Tanguar Haor in northeastern Bangladesh, highlighting the hilsa fishing community's economic significance, with hilsa accounting for 1% of the overall GDP. (Rahman Sunny, Shakil Ahamed, et al., 2019)

The hilsa fishing community in Chandpur, Bangladesh, consists of 410 fishermen from 185 households, primarily Hindus, relying on fishing for livelihood. They face challenges like extortion and lack of credit, with 60% classified as very poor. (Hossain et al., 2022)

The hilsa fishing community in Bangladesh relies on the seasonal lifecycle of hilsa, primarily fishing from July to November. They face challenges from pollution, changing river ecologies, and urbanization, impacting their livelihoods and the hilsa population significantly. The study used multi-sited ethnographic fieldwork in Bangladesh. Sensory ethnography focusing on embodied interactions and experiences. (Cullen, 2023)

This research assesses the resilience of small-scale fishing communities located in the Barguna and Cox's Bazar districts of Bangladesh, in the context of the extraordinary challenges posed by the COVID-19 lockdown (March-May 2020) and a subsequent 65-day fishing ban (May-July 2020). Utilizing the 5C-4R Framework developed by the Zurich Flood Resilience Alliance, the study investigates the interplay between diminished livelihood capitals—including financial, social, and natural resources—and resilience characteristics, thereby elucidating their impact on the communities' capacity to endure and recover from these disruptions. Key findings from 100 interviews with marine fishers indicate that factors such as reliance on a single income source, limited access to aid, financial constraints, lack of alternative livelihood skills, institutional shortcomings, and social inequalities undermined resilience. Notably, financial capital emerged as central to sustaining resilience properties, highlighting the critical need for economic stability. (Bhowmik et al., 2021)

The hilsa fishing community in Bangladesh, particularly at the Meghna river estuary, faces socio-economic challenges, including low literacy, inadequate skills, and reliance on hilsa fishing, with many lacking alternative occupations and insufficient government support during fishing bans. The method used in the study Field survey with structured questionnaire interviews (N = 250). (Ahmed et al., 2021)

The Hilsa fishing community in Bangladesh comprises about 2.5 million people engaged in fisheries. Challenges include overfishing, illegal practices, and inadequate legal enforcement, impacting livelihoods and fish populations, necessitating improved regulations and support systems for sustainable management. In this study, Secondary data from journals, newspapers, and reports. (Chowdhury Keya et al., 2020)

The study shows that Hilsa shad fishery in Bangladesh overfished, needing sustainable management. Study recommends lower length limit, selectivity pattern, and yearly landing limit. It highlights the importance of sustainable management practices for the Hilsa fishery, which significantly contributes to the country's fish production and economy. (Alam et al., 2021)

The hilsa fishing community in Bangladesh benefits from the Hilsa Fishery Management Action Plan, which has led to a revival of hilsa stocks, increased production, and a 52% rise in household income for fishers through sustainable management practices. Adaptive co-management for brood hilsa protection and juvenile conservation. Control of illegal gears and ecosystem resilience initiatives. (Rahman et al., 2020)

The hilsa fishing community in Bangladesh, particularly along the Padma River, faces challenges such as low income, increasing fisher numbers, and lack of alternative livelihoods, impacting their overall livelihood status despite their engagement in various fishing-related activities. Household interviews and Focus Group Discussions (FGDs). Key informant interviews conducted from July to October 2018. (Rahman Sunny, Ahamed, et al., 2019)

This research examines the condition of the Hilsa fishery in Bangladesh, which accounted for 14% of the country's total fish production and 83% of the global Hilsa harvest in 2018. The study underscores the precarious state of the stock, primarily attributed to overfishing, and utilizes three distinct assessment techniques: a traditional length-frequency stock assessment, Froese's length-based sustainability indicators, and a Monte Carlo surplus production-based CMSY approach. The results indicate that the Hilsa stock is indeed overexploited, leading to recommendations that include establishing a minimum catch length of 33 cm, implementing a mesh size restriction of ≥ 8 cm, and setting an annual landing cap of 263,000–315,000 tons. These measures aim to ensure sustainable exploitation and management of the Hilsa fishery. (Alam et al., 2021)

This study examines the socio-economic and livelihood impacts of government-imposed bans and conservation measures on Hilsa fisheries in Bangladesh. Hilsa contributes significantly to national fish production (10.18%) and sustains the livelihoods of 0.45 million fishers, holding substantial cultural and economic value. Hilsa is primarily caught in freshwater and marine ecosystems, with Bangladesh accounting for 65% of the catch within the Bay of Bengal region. Overfishing, particularly during the early 2000s, caused a steep decline in Hilsa stocks, prompting the government to implement conservation measures, including fishing bans, gear restrictions, and regulated fishing seasons. While these initiatives have increased Hilsa production post-ban periods, their implications for fishers' livelihoods remain contested. The bans have resulted in financial hardship for fishers during restricted periods, despite government compensation programs, such as rice distribution and alternative livelihood support. However, these interventions are often limited in scale and effectiveness. This study identifies challenges within the existing compensation framework and explores opportunities for enhancing the livelihoods of affected communities while ensuring sustainable fisheries management. (*Conserving Lish, Securing Livelihoods : Bangladesh-India Perspectives*, 2018)

The Hilsa shad holds the distinction of being the national fish of Bangladesh, significantly influencing the cultural identity of the country. It is a staple in various social and religious events, including weddings, and is widely exported to Bengali communities globally. In the northern Bay of Bengal, around six million individuals participate in the Hilsa value chain, with 95% of the catch originating from this region. Bangladesh is the leading contributor to the Hilsa fishery, responsible for 76% of the total catch, followed by Myanmar and India (Bay of Bengal Large Marine Ecosystem Project, 2010). This fishery is vital to the economy, contributing approximately 10% to the overall fish production in Bangladesh and about 1% to the national GDP (Fisheries Resources Survey System, 2014).

The Hilsa fish is categorized as part of a broader category of aquatic species and vegetation known as blue foods, which play a crucial role in the nutrition, economic well-being, and cultural practices of millions residing along coastal areas. Nevertheless, blue foods in the Bay of Bengal face considerable threats, including overfishing, pollution, and habitat degradation—issues that impact local communities and jeopardize their means of livelihood (Ghosh & Lobo, 2017).

This study is on the fish diversity of the Padma River, which is one of Bangladesh's longest rivers and an important habitat for riverine fish species. Conducted from February 2013 to January 2014, the research recorded 71 fish species, belonging to 10 orders, 26 families, and 54 genera, with Cypriniformes being the most dominant order. The Cyprinidae family was the most prevalent, contributing 23 species. The study also identified four alien species, and 28 species were considered threatened according to the IUCN, including Vulnerable, Endangered, and Critically Endangered categories. When compared with previous studies, a decline in species diversity was noted, highlighting the need for conservation measures. The Padma River has been identified as a crucial refuge for the conservation of threatened freshwater fish in Bangladesh, emphasizing the importance of minimizing anthropogenic impacts, particularly fishing pressure and the introduction of invasive species. (Joadder et al., 2015)

Hilsa fishers in Bangladesh, particularly those in hilsa sanctuaries along the lower Padma and upper Meghna rivers, are highly vulnerable due to their dependence on fishing for survival. A study using the Sustainable Livelihood Approaches (SLA) framework found that these fishers face significant social and economic challenges such as low income, lack of access to credit, and limited alternative income sources. As a result, they are economically fragile and often neglected by mainstream development initiatives. The study suggests that improving their livelihood sustainability requires addressing these vulnerabilities and implementing practical solutions based on the fishers' perceptions and needs. Key recommendations include diversifying income opportunities and enhancing socio-economic support for these communities. (Sunny et al., 2020)

This research explores the economic challenges faced by fishermen due to climate change, particularly how it affects fishing conditions, such as the increasing unpredictability of seasons and fishing locations. These disruptions lead to lower fish catches, which directly impact household income. Fishermen in the Belu region, dependent on capture fishing, are finding it necessary to adopt alternative livelihoods as a strategy to adapt to these changes. The study aims to assess the income of fishermen households, analyze how alternative income-generating activities contribute to total household income, and evaluate the involvement of family members in these activities. Results suggest that developing alternative livelihoods is crucial for mitigating the financial impact of reduced fishing yields caused by climate change, ensuring income stability for these households. (Agusta Paulus et al., 2019)

The hilsa fishing community in Bangladesh comprises over 420,000 artisanal fishermen, providing livelihoods to approximately 2.5 million people. This community faces challenges due to overfishing, limited control measures, and seasonal bans aimed at conserving hilsa resources. Data collected from 32 fish landing stations. Length-frequency and gonad maturity data sampled weekly. (Sarker et al., 2019)

Bangladesh's hilsa shad (*Tenulosa ilisha*) constitutes the largest single-species fishery in the nation, accounting for 11% of the overall catch and providing livelihoods for approximately 2.5 million individuals. In response to a decline in catch since 2003, the government initiated a conservation program that includes economic incentives and payments for ecosystem services (PES) aimed at promoting sustainable management of the fishery. Although this initiative has resulted in enhanced catch statistics, ongoing concerns regarding the socioeconomic conditions of fishers and the long-term viability of the hilsa fishery remain. This study examines the legal and institutional frameworks underpinning the conservation program, identifies challenges related to its design and execution, and proposes recommendations for its enhancement. (Islam et al., 2016).

Income and Livelihood Disruptions

Seasonal fishing bans can lead to significant income losses for fisher households. Studies have highlighted that fisherman often face substantial reductions in household income during the ban periods, which affects their purchasing power and savings (Islam et al., 2020; Hossain et al., 2021). Hossain et al. (2021) examined Hilsa fishers in Bangladesh and noted an average income decline of 50% during the ban period, exacerbating poverty levels among fishing communities.

This research examines the impact of a comprehensive fishing prohibition on the livelihoods of inland fishermen at Poyang Lake, revealing notable shifts in their strategies for sustaining their livelihoods. Utilizing data collected from 275 households, the results indicate that the prohibition compelled fishermen to transition towards alternative employment opportunities, including self-employment, roles in public welfare, or retirement. The choices made by these individuals were shaped by various factors such as age, educational background, social connections, and fishing rights. Although the ban supports environmental objectives and aligns with the long-term interests of the fishermen, the study highlights the need for enhancements in policy execution and adaptability. It advocates for continued research and adjustments in policy to achieve a harmonious balance between environmental preservation and sustainable human development. (Ma et al., 2022)

Alternative livelihood programs have been proposed as a mitigation strategy. Ahmed et al. (2020) found that skill diversification during fishing bans could reduce income variability, though the success of these programs depends on proper implementation and community participation. Seasonal allowances provided by the government were found to be beneficial but often insufficient to cover the full extent of income loss (Rahman & Chowdhury, 2021).

Food Security and Nutrition

Food insecurity is a common issue among fishers during fishing bans. Studies have documented reductions in protein intake among fishing households, as fish—a primary source of dietary protein—becomes less accessible both economically and physically during the ban periods (Kabir et al., 2021; Rajaratnam et al., 2019). Kabir et al. (2021) conducted a survey in Barishal and observed that nearly 70% of fisher families reported skipping meals during the ban period, highlighting the critical nutritional challenges faced by these communities.

This study examines the relationship between fisheries and food security in Indonesian coastal communities, where high dependency on fisheries for income and subsistence makes them vulnerable to food insecurity. The research employs a value chain analysis (VCA) and a "fish as food" framework to investigate how fish harvests influence household access to food and the role of fish in local diets. The findings reveal that small pelagic fish, primarily caught by commercial fishers, dominate both island harvests and consumption. However, small-scale fishers provide crucial support during low catch periods. The consumption of fish is dependent seasonally, with households turning to farmed fish during windy seasons when local catches are low. The study highlights that food security in these communities is more closely linked to fishing income rather than direct fish consumption. It suggests that improved coordination between the fisheries and public health sectors is needed to address food security challenges effectively. (Roberts et al., 2023)

The link between income losses and food insecurity underscores the need for targeted food aid during ban periods. Rajaratnam et al. (2019) emphasized that fishers with access to food relief programs exhibited better food security outcomes compared to those without access.

Impact on Employment and Occupational Shifts

Fishing bans often compel fishers to seek alternative employment to sustain their livelihoods. However, the availability of such opportunities is limited in many rural areas. Zaman et al. (2020)

found that most fishers in Bangladesh struggled to transition to other forms of employment due to a lack of skills and training, leading to increased economic vulnerability.



Source: Wikipedia

Seasonal migration has also been identified as a coping mechanism. Chowdhury et al. (2020) observed that younger fishers often migrate to urban areas for temporary jobs during fishing bans, though this disrupts family dynamics and community structures. While migration helps offset

income losses, it is not a sustainable long-term solution for the entire fishing community.

Role of Government Aid

Government aid programs play a pivotal role in mitigating the socioeconomic impacts of fishing bans. Hilsa fishers in Bangladesh receive financial allowances during ban periods, but several studies highlight challenges in the distribution and adequacy of this aid (Sarker et al., 2020; Ahmed et al., 2021). Sarker et al. (2020) found that while 80% of registered fishers received allowances, the amounts were insufficient to cover basic household expenses.

Corruption and inefficiencies in the distribution process have also been documented. Ahmed et al. (2021) pointed out that non-fishers often exploit these programs, depriving genuine beneficiaries of the support they need. Improved monitoring and accountability mechanisms are essential for ensuring the effectiveness of these initiatives.

Household Debt and Financial Vulnerability

Fishing bans increase the financial vulnerability of fisher households, leading to higher dependence on loans. Studies by Karim et al. (2020) and Das et al. (2019) found that most fishers rely on informal credit sources with high-interest rates during ban periods, trapping them in a cycle of debt. Das et al. (2019) observed that fisher households often borrow money to meet daily needs, repay loans, or repair fishing equipment, further exacerbating their economic struggles.

Social Impacts

Fishing bans also have significant social implications, affecting community cohesion and mental health. Rahman et al. (2020) highlighted increased stress levels and domestic conflicts among fisher families during ban periods. Community-based management approaches, where fishers participate in decision-making processes, have been suggested to alleviate these issues and foster a sense of ownership over conservation efforts (Rahman et al., 2020).

Bangladesh has achieved notable advancements in human development; however, malnutrition remains a significant issue, primarily attributed to inadequate dietary diversity and insufficient micronutrient consumption. Fish, particularly smaller species, plays a crucial role in the Bangladeshi diet by supplying essential micronutrients. Despite a rise in per capita fish consumption driven by the expansion of aquaculture, there has likely been a decline in the consumption of fish sourced from capture fisheries, including small indigenous species that are rich in micronutrients. An examination of data from the years 1996/7 and 2006/7 reveals that while the growth of aquaculture has somewhat alleviated the decrease in fish consumption from capture fisheries and has lessened seasonal fluctuations, it may not entirely offset the reduction in dietary diversity and micronutrient intake, particularly among the poorest populations. The study proposes various strategies to enhance the roles of both capture fisheries and aquaculture in improving food and nutrition security in Bangladesh.

This paper examines how the UK Department for International Development (DFID)-funded Fisheries Management Science Programme assesses the developmental impacts of its commissioned projects. Fisheries management poses a unique challenge for impact attribution due to the complexity, dynamism, and heterogeneity of fishery systems, which operate across multiple scales and involve various stakeholders with sometimes conflicting goals. The paper discusses the methods and models used in the assessment process and highlights the developmental impact achieved by the programme's projects over 11 years. It represents the lessons learned regarding the adoption, uptake, and valuable impact of fisheries management research, which are relevant to both researchers and funders of development-focused research. (Arthur et al., 2010)

Fishing Ban Period in Bangladesh

Type of Ban	Ban Period	Action Plan and Support
Juvenile Hilsa Protection	November to June (Since 2003)	Fishers' families receive 40 kg of food aid per month for four months under the Vulnerable Group Feeding (VGF) program.
Breeding Hilsa Protection	22 days, October to November	A ban during the peak breeding season based on the lunar cycle; families get 25 kg of food aid per household under VGF.
Sanctuary Fishing Restrictions	March-April (five sanctuaries), November-January (one sanctuary)	Total fishing ban in designated breeding and nursery zones to protect Hilsa populations

Source: adapted from Sarker *et al.* (2019)

Research Gap:

In the recent discussion session, researchers with over 25 to 30 years of experience studying Hilsa species emphasized that significant gaps remain in our understanding of the biology and ecology of Hilsa. Despite a century of research dedicated to this species, critical knowledge deficiencies continue to hinder effective conservation efforts and the formulation of sound management strategies. Notably, there is a lack of comprehensive information regarding the feeding and breeding behaviors of Hilsa. Additionally, gaining insights into the factors that influence the timing and patterns of Hilsa migration is essential for developing effective, evidence-based management practices. It is imperative to investigate the motivations behind the fish's migration and their return to marine environments. Regarding the incentive-based conservation strategies for Hilsa, it is essential to conduct thorough research on the effects of financial and in-kind support provided to fishers during extended fishing bans. To date, there has been insufficient examination of the efficacy of top-down management approaches implemented by governmental authorities and their actual impact on the fishing community. Another vital area of study pertains to the equity of resource distribution within incentive-based conservation initiatives, including the allocation of cash and in-kind support to fishers and their families, as well as the distribution of AIGAs. There

are pressing concerns about how these resources are allocated, particularly in relation to gender, religion, political affiliations, and socioeconomic status. A clearer understanding of who benefits from these systems, the fairness of the distribution, and whether certain groups are marginalized is crucial. Addressing these issues is fundamental to bridging the overarching knowledge gap, particularly concerning the balance of costs and benefits for various fishers participating in the conservation scheme.

The existing body of research on Hilsa fisheries predominantly focuses on conservation and ecological outcomes, such as stock replenishment, biodiversity, and environmental impacts. However, studies assessing the socioeconomic effects on fishing communities, particularly in the Barishal region, remain limited. Few studies address the microeconomic implications of fishing bans, such as household income changes, employment diversification, or the effectiveness of compensatory mechanisms. Moreover, there is a lack of longitudinal studies that evaluate how repeated bans affect the long-term resilience and social mobility of fishing households. This study aims to fill these gaps by providing a holistic analysis of the interplay between policy interventions and economic outcomes for Barishal's fishing communities.

Extensive research exists on the ecological importance of Hilsa conservation and the effectiveness of fishing bans in replenishing fish stocks. However, there is limited empirical evidence on the socioeconomic consequences of these bans for the fishing communities in Bangladesh, particularly in Barishal. Previous studies have largely focused on ecological outcomes, leaving a gap in understanding the microeconomic impacts on fishers' income, consumption patterns, and long-term resilience.

Additionally, existing research has not adequately explored the role of economic policies, such as compensation schemes or alternative employment programs, in mitigating these effects. This study bridges these gaps by providing a comprehensive analysis of the interplay between conservation policies and socioeconomic outcomes, with a focus on economic resilience and sustainability.

Incentive Distribution and Associated Challenges

Representatives from the fishing community, including several members from a prominent organization and the leaders of a smaller group, provided their insights regarding the efficacy of the incentive program. They voiced significant concerns regarding the administration of the scheme, indicating that many fishermen currently endure greater sacrifices than the benefits they

receive from participating in the fishing ban and the associated compensation program. A primary source of their dissatisfaction lies in the distribution mechanisms for both cash and in-kind support, including the AIGAs. The existing system is fraught with numerous loopholes, leading to a troubling degree of partisanship in the allocation process. It appears that various categories of fishers experience unequal advantages or disadvantages based on factors such as religion or prior wealth. The government bears considerable responsibility for this inequitable distribution and must take steps to ensure fairness in determining who receives benefits. Additionally, issues of nepotism and mild corruption further exacerbate the inadequate support experienced by many fishermen who are making sacrifices during the ban period.

Sustainability of the Current System Compared to Alternative Viable Options

Government officials and policymakers within the Department of Fisheries (DoF), including the Director General, have articulated their confidence in the potential for sustaining the Hilsa fishery through the existing incentive-based conservation framework. They are optimistic that this approach could lead to an increase in fishery production. However, they emphasize that achieving this vision necessitates enhanced investment in the system to ensure that all fishermen affected by the fishing ban receive adequate compensation and support.

Nonetheless, there are concerns regarding the current situation, where Bangladeshi fishermen are bearing the brunt of a nearly six-month fishing ban, while their counterparts in India and Myanmar continue to fish without similar restrictions. This disparity results in an inequitable distribution of costs and benefits, as the fishermen in neighboring countries benefit from the sacrifices made by their Bangladeshi peers without incurring any costs themselves. To address this imbalance, the establishment of a tri-country common pool resource management system is recommended.

Representatives from the fisheries sector acknowledge that the existing incentive system has provided benefits to fishers, despite the noted inequalities in its distribution. They assert that the system is functioning effectively and should be maintained. Furthermore, they contend that the fishermen are not receiving greater benefits from the compensation system than they did prior to the implementation of management measures, indicating that their overall welfare has improved since these measures were introduced.

Research Objectives:

The primary objectives of this research are to assess the socio-economic impacts of fishing bans on small-scale fishers in Bangladesh, focusing on their livelihoods, food security, and community resilience. This includes understanding the role of alternative income sources, access to credit facilities, and skill development in mitigating the adverse effects of reduced fish catch. The study aims to evaluate the effectiveness of government financial assistance programs, examine changes in household expenditure patterns, and assess the long-term sustainability of the hilsa fishery. Additionally, the research seeks to explore the relationship between fishing bans, community adaptation strategies, and overall socio-economic stability, providing recommendations for improving fisher livelihoods through policy interventions and sustainable fisheries management.

- To analyze the impact of the fishing ban on the income levels of Hilsa fishers in Barishal.
- To evaluate the social consequences of the ban, including household food security, education, and healthcare access.
- To examine the effectiveness of government compensation and support programs for fishers during the ban period.
- To explore the role of economic resilience strategies, such as alternative livelihood programs, in mitigating the negative impacts of the ban.
- The advancement of aging methodologies and the analysis of the age composition within the hilsa population.
- Investigation into the reproductive biology, including the identification of the age at which sexual maturity is reached and the frequency of spawning across various habitats of hilsa.
- Evaluation of the socio-economic conditions of hilsa fishers and the assessment of the effects of various management strategies on their livelihoods.
- To provide policy recommendations for balancing ecological conservation with socioeconomic stability in fishing communities.

Data and Variable Description

Dependent Variables:

Measurement of the Social and Economic Condition of Ban Period:

1. **Household Income:** Measured as the monthly income of fishing households during and outside the ban period.
2. **Food Security Index:** Calculated based on dietary diversity and household meal sufficiency.
3. **School Dropout Rates:** Percentage of school-aged children who discontinue education during the ban.
4. **Household Consumption:** Expenditure on food, education, healthcare, and other essentials.
5. **Indebtedness:** Amount of loans taken during the ban period

Independent Variables

1. **Fishing Ban Duration:** Number of days the ban is enforced annually.
2. **Government Compensation:** Amount of financial or in-kind support received by fishers.
3. **Alternative Livelihoods:** Participation in temporary jobs, such as farming or day labor.
4. **Household Size:** Number of dependents in the household.

Control Variables

1. **Education Levels:** Average schooling years among household members.
2. **Asset Ownership:** Value of fishing boats, nets, and other equipment.
3. **Proximity to Markets:** Accessibility of fish markets and non-fishing job opportunities.

Conceptual Framework:

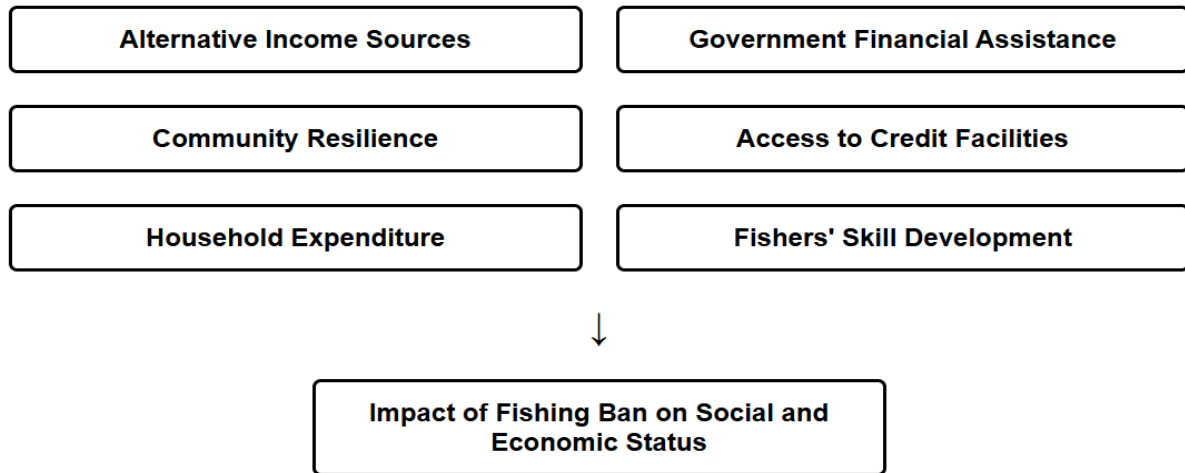


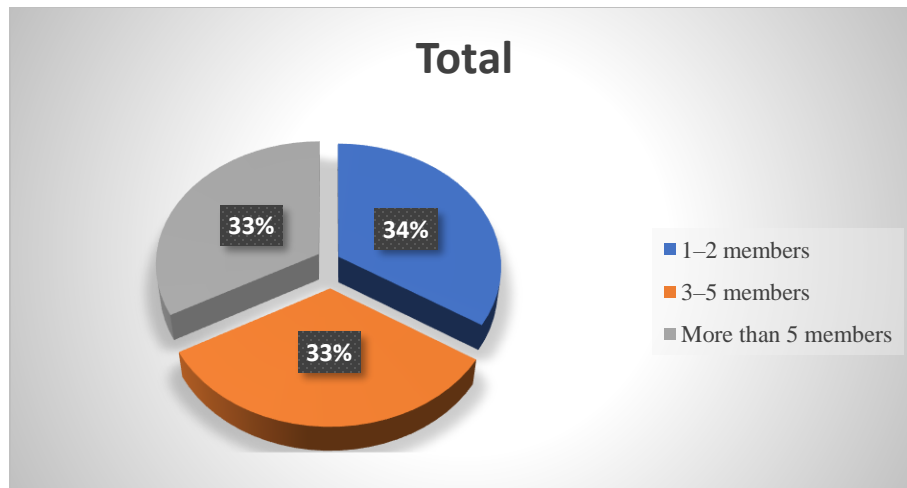
Figure: Conceptual framework based on dependent and independent variables

Descriptive analysis:

Family size:

This chart is a **3D pie chart** that represents the distribution of household sizes among respondents. The chart divides household sizes into three categories:

1. **1–2 members:** Represented by the blue segment, comprising **34%** of the total respondents.
2. **3–5 members:** Represented by the red segment, comprising **33%** of the total respondents.
3. **More than 5 members:** Represented by the green segment, also comprising **33%** of the total respondents



Age:

This chart is a **bar chart** that represents the age distribution of respondents in the study. Each bar corresponds to a specific age group, and the height of the bar indicates the number of respondents within that age range.

Details:

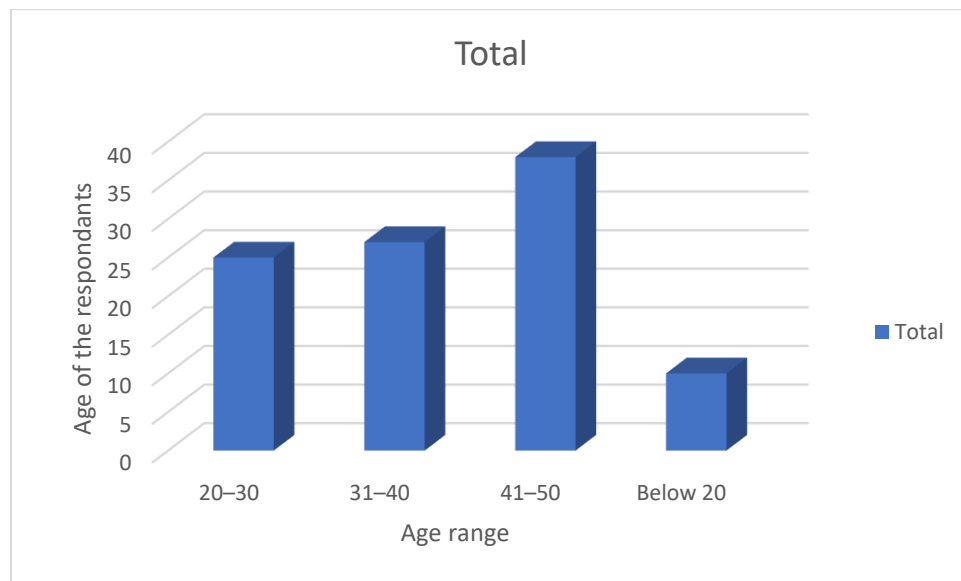
1. **20–30 years:** The bar for this age group shows a moderate number of respondents, indicating a significant proportion of younger adults involved in fishing.
2. **31–40 years:** Similar to the 20–30 age group, this category also has a moderate count of respondents.
3. **41–50 years:** This age group has the highest count of respondents, suggesting that middle-aged individuals form the majority of the fishing population in the study.
4. **Below 20 years:** This category has the lowest number of respondents, indicating minimal participation of younger individuals in fishing activities.

Insights:

- The data highlights that the majority of fishers belong to the **41–50 years** age group, which could imply higher experience levels in fishing.

- The low representation of respondents **below 20 years** suggests that fishing may not be a common career choice for younger individuals or that they are still pursuing education or alternative livelihoods.

This age distribution provides valuable context for understanding how different age groups are impacted by the Hilsa fishing ban and their ability to adapt to alternative livelihoods.



Education:

This chart is a **horizontal bar chart** that represents the education levels of respondents in the study. Each bar indicates the number of respondents falling into specific education categories.

1. No formal education:

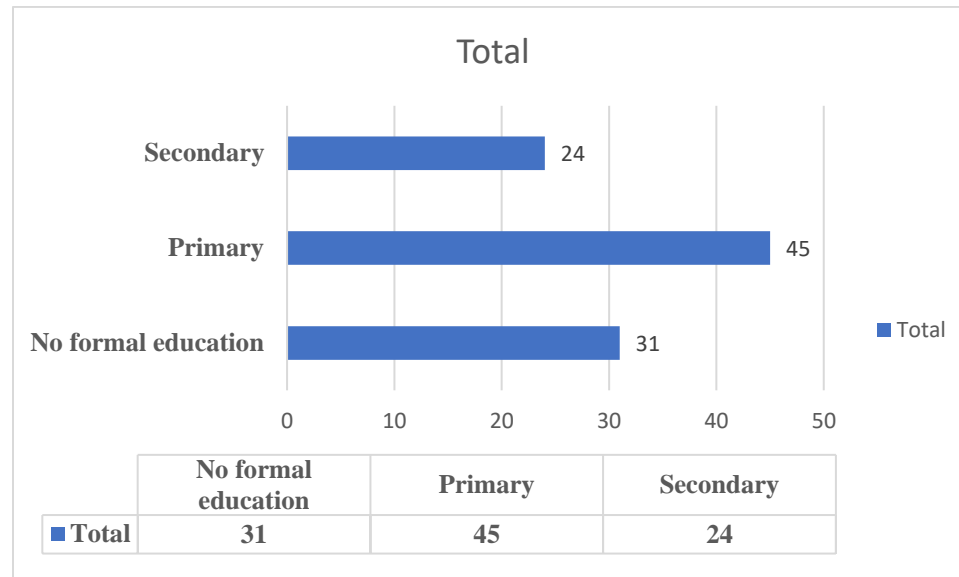
- This group has **31 respondents**, indicating a significant portion of individuals in the fishing community lack formal education.

2. Primary education:

- This is the largest group with **45 respondents**, showing that most respondents have completed primary education, making it the most common education level in the community.

3. Secondary education:

- This group has **24 respondents**, reflecting a smaller proportion of individuals who have pursued secondary-level education.



Insights:

- The majority of the respondents have **primary-level education**, suggesting basic literacy is common but higher education levels are limited.
- A notable portion of the population lacks formal education, which might influence their ability to seek alternative livelihoods during the fishing ban period.
- The relatively low number of individuals with **secondary education** highlights limited access to or prioritization of higher education within the community.

This information provides critical insights into the educational background of fishers and how it might affect their adaptability to alternative income sources and government programs.

Analysis and Findings

Economic Impacts

- **Decline in Household Income:**

During the ban period, average monthly incomes among fishers in Barishal drop by over 70%, plunging many families into poverty. As fishing is often the sole source of income,

alternative livelihood options remain limited, forcing fishers to take loans at high interest rates.

- **Rising Debt Cycles:**

Indebtedness increases significantly during the ban as fishers borrow for daily expenses. Microfinance institutions often step in, but repayment terms can exacerbate financial stress.

- **Cost of Compliance:**

For small-scale fishers, compliance with the ban entails additional economic costs, such as storing equipment or maintaining boats, further straining limited resources.

Social Impacts

- **Food Insecurity:**

A majority of surveyed households report reduced meal frequencies during the ban. The government's rice distribution program provides some relief but often fails to cover household needs, leading to nutritional deficiencies.

- **Education and Healthcare:**

School dropout rates increase during the ban as families struggle to afford tuition fees or prioritize immediate needs. Similarly, healthcare access declines due to reduced disposable income, with many opting for cheaper, less effective treatments.

- **Psychological Stress:**

Fishers face heightened stress levels due to economic uncertainty, with long-term effects on mental health and community cohesion.

- **Effectiveness of Compensation Programs**

Government compensation programs, while well-intentioned, often fall short due to inefficiencies and delays. Rice distributions cover only a fraction of the fishers, and cash support is insufficient to offset income losses. Additionally, a lack of awareness and bureaucratic hurdles prevent many eligible households from accessing these benefits.

- **Alternative Livelihoods**

Some fishers diversify income sources during the ban, engaging in agriculture, poultry farming, or day labor. However, these alternatives provide lower wages, lack stability, and

require skill sets that many fishers do not possess. Expanding training programs and microfinance for non-fishing activities could help mitigate these challenges.

Recommendations

The study recommends strategic investments in livelihood improvements, skill development for alternative income sources, and the establishment of an exclusive social safety net program tailored to small-scale marine fishers. These findings provide valuable insights for emerging economies reliant on the fisheries sector, guiding them to address the socio-economic vulnerabilities of fishers in the face of pandemics and natural disasters.(Bhowmik et al., 2021)

Another research recommends policy reforms emphasizing marine fisheries, socio-economic development, governance updates, and stronger institutional capacity. Aligning with the UN Sustainable Development Goals and Vision 2021, these measures aim to ensure sustainable growth in the fisheries sector.(Shamsuzzaman et al., 2022)

To improve the socio-economic conditions of small-scale fishers in Bangladesh, a multifaceted approach is needed. Diversifying livelihoods beyond fishing, through alternatives such as aquaculture or local crafts, can help mitigate financial instability caused by fishing bans and climate change (Rahman et al., 2023). Financial assistance programs, such as payments for ecosystem services (PES) and enhanced credit access, are crucial for supporting fishers during difficult periods (Chowdhury et al., 2024). Strengthening fisheries management, ensuring legal frameworks, and fostering community-based management can sustain fishery resources while promoting conservation (Ahmed, 2024). Moreover, improving infrastructure, education, healthcare, and resilience within fishing communities can help reduce socio-economic vulnerabilities, while promoting awareness of sustainable fishing practices will further protect aquatic ecosystems (Islam et al., 2023). This comprehensive strategy should be coordinated by both government and non-government sectors to ensure long-term sustainability and food security.

1. The primary suggestion put forth by the group was to halt Jatka fishing. During the prohibition period, the government ought to investigate alternative solutions, as the existing subsidy framework is inadequate to address the issue at hand.

- A consistent supply of food grains should be ensured throughout the duration of the ban.
 - The government must offer adequate subsidies, proposing a minimum of 30 kg of rice per fisherman each month.
 - It is essential to include all fishers in incentive-based programs.
2. Local government authorities, encompassing members of fishermen's committees, their leaders, and fisheries officers, must more effectively address the concerns of fishermen. The pertinent issues include:
 - Inadequate food distribution processes, coupled with corruption within the incentive distribution framework.
 - The necessity for protection of fishermen from theft while engaged in fishing activities.
 - The establishment of community welfare centers for fishers, designed with a comprehensive strategy for the development of fishing villages.
 - The establishment of a Hilsa Fishers' Group (HIFIG) is essential.
 - Improved management practices through Payment for Ecosystem Services (PES).
 3. The utilization of current jal and other harmful fishing nets should be prohibited, and the production of monofilament nets must be halted. It is imperative that the government refrains from issuing licenses for the manufacture of these nets.
 4. River siltation poses a significant challenge to the Hilsa fishery. Initiating a dredging process for river channels, particularly the Meghna channel, is essential to maintain a clear migratory pathway for Hilsa.
 5. Furthermore, the government ought to discontinue leasing the Bollatia river, a segment of the Meghna river, to ensure that this area remains accessible to fishermen. Additionally, the government should consider granting fishermen rights to specific sections of the river, which would promote sustainable conservation efforts.
 6. **Promote Livelihood Diversification:**
 - Introduce vocational training programs in aquaculture, agriculture, and other high-demand fields.
 - Establish microenterprise grants for fishers exploring alternative trades.

Policy implications

The literature underscores the need for integrated policy approaches that balance conservation objectives with the socioeconomic well-being of fishers. Investment in alternative livelihoods, skill development, and efficient distribution of government aid are crucial for ensuring the sustainability of fishing bans as a conservation tool (Hossain et al., 2021; Ahmed et al., 2021).

Government policy can be adjusted to enhance the social, economic, and ecological sustainability of the fishery through several strategies:

1. Implementing dredging operations in river channels, minimizing the discharge of pollutants and industrial waste, constructing fish passes or fish-friendly structures in dams and barrages, increasing upstream water flow, building large reservoirs to retain water during dry seasons, and ensuring the maintenance of normal river flow.
2. Promoting a systematic and equitable selection process for Aquaculture Investment Grant Applications (AIGAs), fostering the establishment of fisher groups and representatives, and identifying local service providers. It is essential to connect a larger number of fishermen to markets to mitigate exploitation by intermediaries, thereby maximizing the social capital of Hilsa fishing communities.
3. Encouraging regional cooperation among the three neighboring countries—Bangladesh, India, and Myanmar. Such collaboration would significantly enhance the management capabilities of the fishery.
4. Launching a research initiative aimed at understanding the current incentive-based conservation strategies for Hilsa, particularly assessing the strengths and weaknesses of existing management practices. Additionally, research should focus on the demand for Hilsa fish for domestic consumption within Bangladesh.

Conclusion

In conclusion, the socio-economic challenges faced by small-scale fishers in Bangladesh, particularly in regions like the Padma and Meghna Riverbanks, are multifaceted, arising from factors such as over-dependence on fishing, financial instability, and environmental vulnerabilities. The decline in fish stocks due to overfishing, climate change, and government-

imposed fishing bans has exacerbated these challenges, leading to negative consequences on household income, food security, and overall well-being. Addressing these issues requires a holistic approach, focusing on diversifying income sources, enhancing community resilience, and improving access to credit and financial assistance. Effective fisheries management, including the promotion of sustainable fishing practices and alternative livelihoods, is essential to mitigate the adverse effects of fishing bans and environmental changes. Additionally, government and non-governmental organizations must work together to provide necessary infrastructure, health, and education services, enabling fishers to build long-term sustainability. By adopting these strategies, the livelihoods of small-scale fishers can be safeguarded, ensuring a balanced approach to conservation and socio-economic development, ultimately contributing to the well-being of fishing communities in Bangladesh (Chowdhury et al., 2024; Rahman et al., 2023; Islam et al., 2023).

The seasonal fishing ban on Hilsa is a critical policy for ensuring ecological sustainability but poses significant socioeconomic challenges for fishers in Barishal. Addressing these challenges requires a multi-faceted approach that balances conservation goals with economic equity. By enhancing compensation programs, promoting livelihood diversification, and improving social safety nets, policymakers can mitigate the adverse impacts of the ban while fostering long-term resilience among fishing communities.

This research contributes to the growing discourse on sustainable natural resource management, emphasizing the need for integrated policies that consider both ecological and socioeconomic dimensions. Future studies should explore the long-term effects of fishing bans on community development and the role of technological innovations in supporting fishers' livelihoods.

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