SOCIAL-ECOLOGICAL ANALYSIS OF RESILIENCE TO CO-MANAGEMENT CHALLENGES AMONG WETLAND FISHERIES COMMUNITY IN BOGIANI, BANGLADESH

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by

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LIST OF ABBREVIATIONS

BBS	Bangladesh Bureau of Statistics
BDT	Bangladeshi Taka (currency)
CBFM	Community Based Fishery Management
DC	Deputy Commissioner
DoF	Department of Fisheries
FGD	Focus Group Discussion
IAD	Institution and Development
IDI	In-depth Interviews
NGO	Non-Governmental Organization
OC	Officer in Charge for a Local Police Station
SP	Police Superintendent of a District
TJMSS	Tahirpur Jamalghor Mosjojibi Sombay Somiti
SES	Social Ecological System
SESF	Social Ecological System Framework
VTMSS	Vati Tahirpur Motsojobi Sombay Somiti
UFO	Upazila Fishery Officer
UNO	Upazila Nirbahi Officer
UP	Union Parishad

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ANALISIS DAYA TAHAN EKOLOGI SOSIAL TERHADAP CABARAN PENGURUSAN BERSAMA DALAM KALANGAN KOMUNITI NELAYAN TANAH LEMBAP DI BOGIANI, BANGLADESH

ABSTRAK

Perikanan tanah lembap pedalaman merupakan sumber penting protein haiwan, sumber pendapatan eksport penting dan pekerjaan bagi penduduk luar bandar Bangladesh dengan lebih daripada dua pertiga penduduknya menjual hasil tangkapan ikan dalam perikanan tanah lembap selain menjadi sumber makanan. Walau bagaimanapun, sumbangan sektor ini kepada ekonomi negara telah berterusan menurun sepanjang beberapa dekad disebabkan oleh penangkapan ikan berlebihan, kaedah penangkapan ikan yang berbahaya, kerosakan habitat, dan peminggiran nelayan dalam pengurusan perikanan. Oleh itu, kajian ini bertujuan untuk menganalisis daya tahan nelayan terhadap cabaran pengurusan bersama dengan menggunakan kerangka Sistem Ekologi Sosial (SESF) di kawasan perikanan Bogiani, daerah timur laut Sunamganj, Bangladesh. Dengan menggunakan kaedah temu bual mendalam dan perbincangan kumpulan berfokus bersama komuniti nelayan Bogiani, kajian ini akan memberikan analisis menyeluruh tentang daya tahan nelayan terhadap cabaran pengurusan bersama. Hasil kajian mendedahkan keupayaan nelayan untuk menangani cabaran ini dihadkan oleh cabaran sosioekonomi dan proses politik hierarki tempatan. Akibatnya mereka terpaksa mendapatkan bantuan orang kaya dalam menguruskan perikanan kerana kos penyelenggaraan yang tinggi dan proses pemajakan yang kompetitif. Keadaan ini akhirnya menyebabkan pemegang pajak yang kaya dan berkuasa mengawal perikanan dan menikmati keuntungannya. Tambahan pula, penangkapan berlebihan dan penurunan dalam persekitaran biofizik

telah menghalang nelayan untuk meningkatkan kawasan perikanan mereka. Hasil kajian juga menunjukkan bahawa komuniti nelayan terlibat secara minimal dalam proses pengelolaan perikanan dan pembentukan kerjasama nelayan tidak membolehkan nelayan untuk bersatu dan menguruskan perikanan mereka secara bebas. Dapatan kajian juga mendapati bahawa pengurusan secara bersama gagal memotivasi komuniti nelayan untuk secara bersama menangani cabaran ekologi bagi menguruskan perikanan secara lebih lestari. Akibatnya, ramai penduduk meninggalkan kawasan tersebut kerana tidak dapat mencari sumber pendapatan melalui penangkapan ikan. Dengan memposisikan kajian ini dalam bidang Antropologi Perikanan, penyelidikan ini bertujuan untuk menyumbang penyelesaian bagi mengurangkan cabaran pengurusan bersama dalam perikanan tanah lembap. Ia menyediakan strategi penyelesaian kepada isu konflik ke atas sumber, memupuk kebersamaan dalam kalangan nelayan, pembangunan dan pemuliharaan tanah lembap, dan menggabungkan pengetahuan tempatan ke dalam strategi pengurusan perikanan.

SOCIAL-ECOLOGICAL ANALYSIS OF RESILIENCE TO CO-MANAGEMENT CHALLENGES AMONG WETLAND FISHERIES COMMUNITY IN BOGIANI, BANGLADESH

ABSTRACT

Inland wetland fisheries are a crucial source of animal protein, export earnings, and employment for Bangladesh's rural population, with over two-thirds of people either consuming or selling fish caught in these fisheries. However, the sector's contribution to the national economy has consistently declined over the decades, primarily due to overfishing, harmful fishing methods, habitat degradation, and the exclusion of fishers from fisheries management. Therefore, this study aims to analyze fishers' resilience to co-management challenges by applying the Social-Ecological System Framework (SESF) in the Bogiani fishery located in the northeastern Sunamganj district of Bangladesh. Through in-depth interviews and focus group discussions with Bogiani fishers, this study generates a comprehensive assessment of their resilience to these challenges. The findings reveal that fishers' ability to address these issues is largely restricted by socioeconomic barriers and local hierarchical political processes. Consequently, fishers are compelled to seek assistance from wealthier individuals to manage the fishery due to high maintenance costs and the competitive leasing process. This situation ultimately grants wealthier leaseholders to establish their control over the fishery and its profits. Furthermore, overharvesting and a decline in biophysical conditions hinder fishers from developing the fishery. The findings also indicate that fishers have limited participation in the governance of the fishery. Notably, the establishment of a fisher's cooperative does not enable fishers to unite and manage their fisheries independently. The study concludes that co-

management has failed to inspire collective action among fishers to address ecological challenges for sustainable fishery management. As a result, many individuals are leaving the area because they cannot earn a living through fishing. Positioned within the field of Anthropology of Fisheries, this study aims to contribute solutions to alleviate co-management challenges in wetland fisheries. It emphasizes the need to resolve conflicts over resources, foster mutuality among fishers, develop and conserve wetland fisheries, and incorporate local knowledge into fishery management strategies.

CHAPTER 1
INTRODUCTION

1.1 Introduction

Local fishers frequently encounter a range of social and ecological challenges in co-managing wetland fisheries in Bangladesh (Ferdous, 2023; Khan et al., 2016; Mamun et al., 2016; Newaz and Rahman, 2019; Shamsuzzaman et al., 2017). Their property rights and livelihoods often remain vulnerable to these challenges associated with fisheries co-management (Kalikoski and Allison, 2010). The resilience lens proves useful in enhancing the understanding of co-management challenges to enable fishers to find the right ways to manage fisheries and livelihood from fishing (Clay and Olson, 2008). Moreover, in-depth knowledge about the longstanding challenges is required to improve co-management in wetland fisheries. The acquired knowledge can contribute to developing new ideas for reformulating existing institutions and policies and minimizing challenges to ensure fishers' rights and authority in wetland fisheries co-management (Hossain and Rabby, 2019). However, personal interests in vulnerability and resilience studies motivate the researcher to undertake this study on fisheries. The effectiveness of qualitative methodology in providing a holistic analysis of fishers' enduring challenges and deprivation of rights with the help of a framework also motivates the researcher to conduct this research.

This study aims to analyze fishers' resilience to co-management challenges by applying the Social-Ecological System Framework (SESF) adapted from McGinnis and Ostrom (2014) in the Bogiani fishery located within the wetland areas of northeastern Sunamganj district, Bangladesh. The SESF can contain various interrelated theoretical approaches to identify fishers' challenges for their institutions,

governance processes, and adaptation to social-ecological settings in fisheries co-management (Partelow et al., 2018). It considers multidimensional aspects—social, ecological, cultural, and economic—to allow for an all-embracing investigation of fishers' challenges for co-management (Galappaththi et al., 2022). The SESF connects and compares diverse theoretical approaches to underpin the analysis of fishers' challenges in fisheries co-management (Kalikoski and Allison, 2010). It classifies a closely linked set of social and ecological variables for diagnosing the challenges for fisheries management and fishers' survival (Partelow and Boda, 2015). This wide-ranging group of variables can jointly describe the effects of fishers' co-management challenges on their resilience (Clay and Olson, 2008). The SESF is suitable for analyzing fishers' resilience to their socioeconomic, cultural, and ecological challenges that shape both fisheries management and fishers' occupation and earnings from fisheries (Pope et al., 2014).

Fisheries Anthropology focuses on the lives and livelihood of fishers; interconnected sociocultural, political, economic, and ecological aspects of fisheries social-ecological systems (SESs); and fishers' resilience to their challenges in fisheries management (McCormack and Forde, 2020). The limited participation due to diverse social-ecological challenges mainly restricts the management ability of fishers in fisheries SESs co-management (Lozano and Heinen, 2016; Partelow et al., 2018). Positioned within the field of Anthropology of Fisheries, this study intends to explore fisheries co-management challenges and their effects on wetland fishers' adaptation, coping strategy, and overall ways of life.

Inland wetland fisheries are an important source of animal protein, export earnings, and employment for Bangladesh's rural population (Department of Fisheries (DoF), 2018; Shamsuzzaman et al., 2017). They provide the lives and livelihoods of many rural Bangladeshis being linked in part or in full to fishing, fish-processing, and fish-trading in rivers and estuaries, canals, beels, lakes, haors, and floodplains (DoF, 2018). As such, fishing has become a critical source of earnings and occupation for wetland communities, with more than two-thirds of people consuming or selling fish caught in wetland fisheries (Thompson et al., 2003). Nearly 1,216,539 metric tons of fish were harvested from Bangladesh's 3,927,142 hectares of wetland water during the 2017-18 fiscal year (DoF, 2018). However, this sector's contribution to the national economy has continually decreased, from 62.59 percent in 1983-84 to 28.45 percent in 2017-18 (DoF, 2018). The main reasons for the decline are overfishing, harmful fishing methods, habitat damage, and the exclusion of fishers from fisheries management (Newaz and Rahman, 2019). To deal with these challenges, the government of Bangladesh has adopted a community-based fisheries management (CBFM) strategy aimed at engaging fishers in the co-management of the nation's fisheries (DoF, 2018; Thompson et al., 2003). This strategy promotes the joint management of fisheries by having the fishers and governmental bodies (e.g., DoF and local governments) share power and responsibility for fisheries resources to ensure their sustainable use (DoF, 2018; Newaz and Rahman, 2019; Thompson et al., 2003).

The CBFM approach aims to ensure that fish resources are managed in a way that safeguards present and future use by promoting: the delegation of fishing rights to local fishers, the formation of organizations among fishers, collaboration between stakeholders (DoF, local government, fishers, and local people), the equal sharing of

benefits, and the enhancement of alternative forms of employment and personal skills (Thompson et al., 2003). The CBFM approach also emphasizes resolving conflict over resources, establishing mutual understanding among fishers to ease co-management, developing and conserving sanctuaries, and integrating local knowledge into fishery management strategies (Thompson, 2004). These activities have been shown to foster fishers' ability to co-manage fisheries and, consequently, their livelihoods (DoF, 2018; Islam et al., 2014; Khan, 2012; Rahman and Begum, 2010; Sultana and Thompson, 2007). Nonetheless, fishers' access and declining wetland fisheries resources have yet to be fully restored (Newaz and Rahman, 2019; Shamsuzzaman et al., 2017; Thompson, 2013).

1.2 Context of the Research

1.2.1 Anthropology of Fisheries and Co-management

Fishers experience diverse sociocultural, economic, political, and ecological challenges in co-managing wetland fisheries in Bangladesh (Deb and Haque, 2017; Khan et al., 2016). The key co-management challenges comprise inconsistent and inflexible institutions, harmful fishing practices, inequity, unequal power relations, and declining fish production (Davis and Ruddle, 2012; Deb and Haque, 2017; Khan et al., 2016). Such challenges impede the capacity of fishers to co-manage fisheries and maintain livelihoods and lives in Bangladesh (Deb and Haque, 2017; Khan et al., 2016). Since fisheries provide livelihoods for fishers, they are deeply embedded in the lives and culture of the fisheries community (Coulthard et al., 2011). Fisheries structure the way of life of the fisher community in the northeastern wetland areas of Bangladesh. The fishers, however, often face challenges in co-managing fisheries and

their livelihood in diverse settings (Jentoft and Chuenpagdee, 2009). As a result, they frequently fail to maintain the fisheries as a sustainable source of their livelihood.

The existing studies partly or separately focus on social or ecological challenges of co-management but miss their overall effects on fishing way of life, livelihood, and fishers' resilience (Johnson, 2010; Salomon et al., 2019). For example, the emphasis on fish catch, or reasons for catch decline, ignoring intersecting social, economic, political, and ecological challenges, presents only a part of the total problem for fisheries management and fishers' resilience globally (Said et al., 2019). While resilience is interdisciplinary, the analysis of a single dimension (social, economic, cultural, political, ecological) partially demonstrates the resilience of a fishery SES in American contexts (Clay and Olson, 2008). Fisheries governance usually stresses economic (earnings) or ecological (total catch) aims, while the effects of fisheries governance on fishers' livelihood and fisheries and fishers' resilience need to be analyzed by integrating social, political, economic, and ecological aims in Icelandic fisheries (Chambers and Kokorsch, 2017). Issues on the challenges in fisheries co-management are often overlooked (Davis and Ruddle, 2012). The extensive study of various challenges and their effects on fishers' capacity to co-manage fisheries and livelihood has been conducted using anthropological perspectives.

Fisheries anthropology focuses on the sociocultural, political, and economic aspects of fishing, fishers, and fisheries management while governance processes usually emphasize fishery users and governing bodies in fisheries management (Jentoft, 2000; McCay, 1978). The procedures to manage fisheries are based on

sociocultural and political processes that determine the regulation, exploitation, and distribution of benefits for fishery users (Mansfield, 2011).

Fishers and fisheries management are influenced by the embedded sociocultural and political processes (Moore, 2012). However, fisheries management emphasizes the maximum catches from fisheries (Thornton and Hebert, 2015). It is a governance process through the relationship between fishers and government bodies, mostly shaped by underlying sociocultural and political procedures for resource extraction and conservation (McCormack and Forde, 2020). The role of fishers and government bodies in co-management is challenged by local characteristics and contexts of fisheries (Davis and Ruddle, 2012).

Moreover, the sociocultural and political processes (well-off persons' control over fisheries and capitalization of resources) that restrict fishers' access and rights in fisheries receive less attention in the existing studies of fisheries co-management (Davis and Ruddle, 2012; McCormack and Forde, 2020). Anthropology of Fisheries applies the SES framework to generate an all-inclusive understanding of sociocultural, economic, political, and ecological contexts that foster or hinder fishers' resilience to challenges in fisheries co-management (Aswani, 2020). An anthropological approach based on qualitative methods would be useful for analyzing the effects of co-management challenges on the fisher and fisheries community.

This study will utilize the SES framework to explore co-management challenges that affect the resilience of fishers in different social-ecological contexts. The SESF has the potential to outline diverse complex challenges in fisheries co-

management with a broader context-specific description (London et al., 2017). The in-depth analysis of fishers' resilience to co-management challenges provides a vivid picture of the role of co-management in fishers' lives, livelihood, and fishing way of life in the northeastern wetland fisheries of Bangladesh. The study of co-management in wider contexts (social, cultural, political, economic, and ecological) generates an overall description of fishers' rights in fisheries and their resilience to challenges in establishing rights in fisheries. Analyzing fisheries in their contexts provides a relevant account of co-management (Davis and Ruddle, 2012). The efficacy of co-management requires the consideration of various context-specific challenges about fisheries and the active participation of relevant stakeholders (Davis and Ruddle, 2012). The integrated contextual insights of fisheries may lead to an overarching analysis of fishers' resilience to co-management challenges in Bangladesh.

1.2.2 Resilience and Co-management in Anthropology

Co-management of fisheries resources appears challenging due to the increasing reliance of people on wetland resources for subsistence. The effectiveness of fisheries management depends on the active collaboration between fishers and government agencies to protect fisheries resources by enforcing rules, although the lack of monitoring to control overexploitation or illegal fishing often leads to the failure of community-based fisheries management (Pinkerton and Weinstein, 1995). The challenges to integrating institutions and efforts from government and private stakeholders may constrain the success of fisheries co-management (Pinkerton et al., 2014). While there is a lack of activities to integrate diverse local knowledge and understanding to narrate people-fisheries connections and sustainable fisheries management, anthropologists can lead the ways to raise key challenges to fishers'

resilience and address them for sustainable fisheries SESs management (Aswani, 2020).

The co-management of wetland fisheries is complicated by numerous critical challenges related to diverse social factors, including conflicts between various institutions, a lack of protocols for monitoring institutions and enforcing policy, exclusionary decision-making, and power imbalances (Carrillo et al., 2019; Hossain and Banik, 2022; Hossain and Rabby, 2019; Lee et al., 2019; London et al., 2017). The absence of conflict-mitigation procedures, scarcity of livelihood redundancy, disregard of shared learning in the pursuit of continual improvement, weak leadership, lack of faith and mutuality among actors, and weak collaboration among stakeholders also complicate co-management (Carrillo et al., 2019; Hossain and Rabby, 2019; Lee et al., 2019; Nayak and Berkes, 2019; Pellowe and Leslie, 2020; Salomon et al., 2019).

In addition, the co-management of fisheries must also contend with ecological factors such as decreasing species diversity, catch decline, lack of resource mobility, inadequate knowledge about local ecology and practices, and environmental changes (Basurto et al., 2013; Carrillo et al., 2019; d'Armengol et al., 2018; Johnson et al., 2014; Lee et al., 2019; London et al., 2017; Lozano and Heinen, 2016; Nayak and Berkes, 2019; Pellowe and Leslie, 2020). Given these social and ecological factors, Bangladesh's fisheries are best analyzed as a social-ecological system (SES), as the failure to address these challenges adequately is likely to lead to disparity and conflict among stakeholders and resource degradation (Basurto et al., 2013; Johnson et al., 2014; Lozano and Heinen, 2016; Ostrom, 2009; Partelow and Boda, 2015; Partelow et al., 2018; Ratner and Allison, 2012; Salomon et al., 2019).

Fisheries anthropology often focuses on these challenges (inequity, power relations, exclusion of local knowledge) that have adverse implications for fishers-fisheries relations (Aswani, 2020; McCormack and Forde, 2020). Such challenges adversely influence fisher communities due to their dependence on fisheries for subsistence. Thus, fishing communities must develop resilience, as this will bolster their ability to address the challenges in co-managing fishery SESs (Lee et al., 2019; Nayak and Berkes, 2019; Pellowe and Leslie, 2020; Salomon et al., 2019). Indeed, the resilient and adaptable co-management empowers fishers to devise their strategies, decisions, and activities to deal with the challenges inherent to their specific fishery SES (d'Armengol et al., 2018; Lee et al., 2019; Marshall and Marshall, 2007; Salomon et al., 2019; Satumanatpan and Pollnac, 2020).

1.2.3 Resilience within Fisheries Social-Ecological Systems (SESs) and SES Framework

The resilience of fishers within a fishery SES implies their ability to cope with and adapt to challenges associated with the system's ongoing actions and arrangements (Blythe, 2015; Johnson et al., 2014; Marshall and Marshall, 2007; Salomon et al., 2019). Understanding the level of resilience of a fishery SES assists fishers in formulating plans for continuing or reestablishing their services in terms of the existing conditions (Marshall and Marshall, 2007). Resilient SESs continue to provide resource users with expected outcomes and can respond to unexpected challenges in resource management (Allen et al., 2018). The SESs cover both ecological and social sides of resource management (Folke et al., 2002) in which resilience demonstrates the ability of resource users to sustain socioeconomic and environmental challenges (Adger, 2000). While resilience can be the aim of different

resource management regimes, it can also be viewed as the outcome of SESs (Allen et al., 2018). Therefore, the major social and ecological drivers and challenges within an SES constitute, sustain, or decline resilience (Allen et al., 2018). Fishers' resiliency to fisheries management is due to challenges, such as resource scarcity, bans on use, adaptation to new resource-use policies, and livelihood uncertainty (Walker and Meyers, 2014).

The resilience analysis remains undeveloped, as most procedures employ small-range or inappropriate scales for analyzing parts of an SES, participant feedback regarding personal well-being, and key drivers instead of multiple scales across various arrangements and interests (Angeler and Allen, 2016). The procedures to analyze resilience also display practical challenges for wide-ranging attributes and everchanging structures of SESs (Quinlan et al., 2016). Furthermore, current resilience analyses overlook uncertainties and challenges in fishery SESs as well as the resultant degrees of fishers' resilience (Johnson et al., 2014; Salomon et al., 2019). Analysis of challenges may enhance understanding of learning deficiency, adaptation strategies, and ability to address major challenges about fisheries SESs and fishers' resilience.

1.2.4 The Socio-Ecological System Framework (SESF) in the Context of Bangladesh

The SESF developed by McGinnis and Ostrom (2014) can be used to diagnose the challenges associated with co-management and their effects on fishers' resilience (Basurto et al., 2013; Carrillo et al., 2019; d'Armengol et al., 2018; London et al., 2017; Lozano and Heinen, 2016). The SESF is suitable for analyzing the effectiveness of SESs, combines and compares a range of social and ecological variables and their interactions adaptable to local contexts to investigate the possibility of self-

organization for sustainable common resource governance (Delgado-Serrano and Ramos, 2015; Johnson et al., 2019; Xie et al., 2019). This framework can classify relevant social and ecological contexts (important drivers and challenges) that influence the performance of a fishery SES (Carrillo et al., 2019). An SESF diagnoses challenges to fishers' resilience in the co-management of fisheries by analyzing interactions between important SES variables and the fishers' local settings (Basurto et al., 2013; Partelow and Boda, 2015; Partelow et al., 2018). It also facilitates qualitative analysis of fisheries' SES resilience through the classification of data (London et al., 2017; Lozano and Heinen, 2016; Partelow et al., 2018).

The use of qualitative data can be effective in producing a deeper description of SES variables and their interactions reflecting fisheries co-management outcomes in diverse social-economic-ecological contexts (Carrillo et al., 2019; London et al., 2017; Partelow et al., 2018). The challenges to fishers' resilience are embedded in broader contexts of fisheries SESs, suggesting local sociocultural, economic, political, and ecological aspects shape fishers' lives and adaptive capacity to face their fisheries management challenges (Aswani, 2020). These challenges may be explored by employing an anthropological approach (Aswani, 2020) in the context of wetland fisheries in Bangladesh. In this work, an SESF is applied using descriptive methods to diagnose and analyze the co-management challenges and their overall effects on the lives, livelihood, and resilience of fishers in the context of Bogiani fishery, located in the northeastern floodplain areas of Bangladesh's Sunamganj district.

1.3 Problem Statement

The challenges in co-management restrict fishers' rights and harm the sustainability of fisheries (Biswal et al., 2017; Thompson, 2013; Vaccaro et al., 2013). While existing literature analyzes co-management challenges and resilience using specific theoretical approaches (Allen et al., 2018; Armitage et al., 2009; Chaffin et al., 2014; Chambers and Kokorsch, 2017; Cinner and Barnes, 2019; Djalante et al., 2011; Fabinyi et al., 2014; Said et al., 2019; Vaccaro et al., 2013), both resilience and co-management studies are interdisciplinary and multidimensional (Clay and Olson, 2008; Pope et al., 2014). For example, social, economic, cultural, political, and ecological dimensions show the likelihood of an overarching analysis of fishers' resilience in fisheries co-management (Kalikoski and Allison, 2010).

A social-ecological system framework (SESF) is particularly effective for analyzing the social and ecological challenges to fishers' resilience in the co-management of fishery SESs (Partelow et al., 2018). An integrated framework that combines diverse approaches for analyzing key aspects of fishers' resilience (social, cultural, economic, ecological) is important in exploring co-management challenges (Salomon et al., 2019). Understanding the effects of these challenges on fishers' lives and livelihood, fishing practices, and their ability to manage fisheries is necessary for designing and implementing strategies for fisheries co-management (Henry and Johnson, 2015; Vaccaro et al., 2013). This study will deploy the SESF to analyze fishers' resilience to co-management challenges in the context of the Bogiani fishery situated in northeastern floodplain areas under Sunamganj district in Bangladesh.

Although co-management delegates fishing rights to local fishers, it fails to ensure their access and benefits to wetland fishers in Bangladesh due to higher leasing and maintenance costs and intrusion of socially and politically powerful persons and groups (Mondal et al., 2010; Newaz and Rahman, 2019). This situation forces the impoverished local fishers to transfer fisheries to the locally rich and powerful individuals (Ferdous, 2023; Tima et al., 2021). Then the power groups take control and most benefit from wetland fisheries (Ferdous, 2023; Hossain and Rabby, 2019; Sharif, 2013). While the government formulates co-management policies to protect fishers of wetland fisheries, government bodies rather assist the power groups in occupying fisheries in Bangladesh (Thompson, 2013; Tima et al., 2021).

For example, the fishers of Bogiani fishery receive support from a locally rich and powerful person to manage expenses and prevent disturbances in the fishery. The government of Bangladesh enforces fisheries rules and policies contrary to customary ones restricting fishers' rights in wetland fisheries (Fagun and Rishan, 2023; Ferdous, 2023; Thompson, 2013). The hierarchical political structure allows powerful people and groups to evict local leaseholders from wetland fisheries violating government rules (Hossain and Rabby, 2019). Local fishers still have limited rights in wetland fisheries in Bangladesh (Ferdous, 2023; Hossain and Rabby, 2019; Mondal et al., 2010; Newaz and Rahman, 2019).

Additionally, the northeastern area of Bangladesh is full of wetland fisheries, significantly contributing to the nutrition and employment of people in the floodplains. Wetland fisheries are becoming vulnerable to an increasing population that depends on fisheries for livelihood, catch decline, and habitat degradation due to destructive

fishing methods (Shamsuzzaman et al., 2017). Such challenges coupled with ineffective rules, actors, and organizations; weak collaborations among stakeholders; and lack of shared learning and stewardship for resource maintenance impede fishers to co-manage fisheries (Frawley et al., 2019; Newaz and Rahman, 2019). Co-management challenges adversely influence fishers' livelihood and fisheries maintenance and are a critical issue for respective government authorities, policymakers, and environmentalists in Bangladesh (Newaz and Rahman, 2019). When fishers lack participation in fisheries management, they are likely to be excluded from fishing rights and fisheries benefits, which often leads to conflict among stakeholders, overexploitation of fish resources through destructive fishing practices, and long-term habitat damage (Mosepele and Kolawole, 2017).

Fishers' lack of access to fisheries raises uncertainty over their livelihood and questions about co-management. Dealing with these challenges will give policymakers the insight to modify their policies and improve plans to ensure fishers' rights and sustainable fishing practices in wetland fisheries. It is also important to address these challenges to enhance both fisheries and fishers' adaptive capacity (Khan et al., 2016; Mamun et al., 2016). Fishers' knowledge and experiences of perceived challenges to adaptation will enhance their ability to address unforeseen future challenges in fisheries co-management (Vaccaro et al., 2013). The faith in managing fisheries resources instead of consuming strongly motivates fishery users to sustainably utilize their resources (Alonso-Población et al., 2018; Pinkerton et al., 2014).

The missing gaps in the Anthropology of Fisheries studies include the lack of efforts to study the multiple aspects of fisheries SESs challenges and their effects on fishers' resilience in fisheries co-management (Aswani, 2020; McCormack and Forde, 2020). This study proposes a qualitative case study approach to uncover the overall scenario of the Bogiani fishery co-management. The data will be gathered from fishers and government officials co-managing the Bogiani fishery through in-depth interviews, focus group discussions, and documents. The data can describe research questions and fill the missing research gaps by revealing informants' insights into co-management challenges and fishers' resilience.

This study intends to explore the diverse aspects of fisheries SES co-management and their effects on fishers' resilience in the context of wetland fisheries in Bangladesh. The SESF can be applied to studying the multiple aspects of fisheries SES co-management challenges and their effects on fishers' resilience and to contributing to enriching the existing body of literature on the anthropology of wetland fisheries co-management and fishers' resilience.

1.4 Research Question(s)

Motivated by the problem statement and gaps identified in the literature, several research questions were formulated to explore fishers' challenges to their resilience in co-management. This study will try to answer the following questions:

1. What are the key challenges experienced by fishers in the co-management of the Bogiani inland wetland fishery?
2. How do co-management challenges affect fishers' resilience in the Bogiani inland wetland fishery?

3. What are the experiences and strategies employed by fishers to respond to challenges in fisheries co-management?

1.5 Research Objectives

General: To analyze fishers' resilience to co-management challenges.

Specific:

1. To explore the key challenges experienced by fishers in the co-management of the Bogiani inland wetland fishery.
2. To analyze the effects of co-management challenges on fishers' resilience.
3. To describe the experiences and strategies employed by fishers to face their challenges in fisheries co-management.

1.6 Scope of the Study

A substantial number of studies have focused on fisheries co-management in Bangladesh (e.g., Mamun and Brook, 2015; Newaz and Rahman, 2019), however, the challenges for co-management and their effects on fishers' resilience have not been adequately studied. This study intends to investigate diverse challenges that influence fishers' resilience in inland wetland fisheries co-management. It will adopt the SESF to analyze sociocultural, economic, and ecological aspects of fishers' resilience to their challenges in fisheries co-management. It will be limited to eighteen (18) in-depth interviews and five (5) focus group discussions (FGDs) among fishers and government officials who have been involved in the co-management of Bogiani fishery. The population includes 29 members from *Tahirpur Jamalgar Motsojibi Sombay Somiti* (Tahirpur Jamalgar Fishers' Cooperative Association) (TJMSS) that leased the fishery from the government for the six years from 2017-2023, 18 members from *Vati (low-*

lying) Tahirpur Motsojibi Sombay Somiti (Vati Tahirpur Fishers' Cooperative Association) (VTMSS) that leased the fishery from 2010-2016, and 3 government officials directly involved in the co-management of the fishery.

1.7 Relevance and Rationale for the Study

First, the outcomes of this study will inform society that co-management challenges impede the ability of wetland-dependent fisher communities to manage fisheries for long-term use and their livelihood. The inability of fishers to manage fisheries justifies the importance of effective, enduring fisheries co-management. Second, the practice of co-management based on outcomes drawn from this study will assist fishers in maintaining fisheries resources and their livelihood. Third, policymakers will benefit from the recommendations proposed by the researcher to address challenges for enhancing the role of co-management in wetland fisheries. Fourth, the experience of this study will be used to draw out an outline for sustainable resource extraction and fisheries co-management. Finally, this study will also help reveal the important aspects of co-management not discovered by other scholars. A new perspective of co-management may arrive, as a result, to foster both fishers' and fisheries' resilience.

1.8 Organization of the Study

Chapter 1 outlines the background of the study including the contexts with detailed descriptions of the necessity and usefulness of the research in Bangladesh. It also outlines the problem statement, research questions, research objectives, scope of the study, and relevance and rationale for this study.

Chapter 2 critically reviews the literature to assess past discourses on the research subject and the theoretical streams that serve as the foundation of this thesis. It comprises relevant literature about fisheries co-management, fishers' livelihood and socioeconomic improvement, challenges for co-management, wetland fisheries co-management in regional and global contexts, maritime Anthropology about fishing and fisheries co-management, Raymond Firth's study on Malay fishermen, comparison of fishers' resilience to co-management challenges in Bangladesh and other countries, and fishers' resilience regarding Bangladesh. This chapter identifies the gaps in the existing literature and describes the procedures to fill the research gaps.

Chapter 3 discusses in detail the methodological aspects in terms of research design, data collection methods, population and sampling, researcher's role, limitations, and explication of data. It also explains the research design with the explanation to conduct research during the COVID-19 pandemic, online and in-person uses of the research methods for data collection, and inclusion and exclusion criteria for in-depth interview (IDI) and focus group discussion (FGD) informants. Then, this chapter presents the justification and challenges for conducting FGDs, sampling with profiles of IDI and FGD informants, units of analysis, research instruments, rapport building, researchers' position during data collection, operational definition of key concepts, and data analysis procedures.

Chapter 4 presents the key challenges influencing fishers' resilience in the co-management of Bogiani inland wetland fishery. It highlights fishers' key challenges for social-economic-political settings (S), fishery resource systems (RS) and resource units (RU), fishery governance systems (GS), diversified actors (A), interactions (I)

and outcomes (O), and related ecosystems (ECO) in the co-management. The next section summarizes fishers' co-management challenges using the SESF. The final section underlines the discussion of co-management challenges for fishers' resilience by comparing various studies from Bangladesh and other countries.

Chapter 5 describes the effects of co-management challenges on fishers' resilience. The introductory section describes fishers' exogenous challenges for their resilience. The following sections present the consequences of the co-management challenges on fishers' resilience. The subsequent section narrates the experiences and strategies used by fishers to face challenges in the Bogiani fishery co-management. This section sequentially describes the outcomes of fishers' approaches to coping with co-management challenges. The discussion section compares the results of this study with the existing body of literature.

Chapter 6 outlines the important results, the application of the SESF, theorizing resilience, various strengths and limitations of the study, recommendations and future research suggestions, and policy implications.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter critically reviews the literature on co-management challenges and their effects on fishers' resilience from the lens of the Anthropology of Fisheries. The chapter begins by exploring the literature on the Anthropology of fisheries and fisheries management in general and narrowing down to the challenges for fishers' resilience and their coping strategies for facing those challenges in fisheries SESs co-management. The following section analyzes the aspects of fishers' resilience and co-management challenges in diverse social-cultural-political settings. Then, this chapter highlights the studies about wetland fisheries co-management in regional and global contexts and maritime Anthropology about fishing and fisheries co-management. The next section presents Raymond Firth's study on Malay fishermen. The successive part provides the comparison of fishers' resilience to co-management challenges in Bangladesh and other countries across the world. The last section describes the aim of the research by examining the literature on fisheries co-management challenges and fishers' resilience. This chapter finishes with the depiction of theoretical and conceptual frameworks that shape the study on fishers' resilience to co-management challenges.

2.2 Maritime Anthropology and Anthropology of Fisheries

Maritime anthropology is a subfield of cultural anthropology devoted to the study of coastal cultures from an anthropological perspective that was popular in the mid-1970s (Casteel and Quimby 1975; Smith 1977a; Spoehr 1980; Acheson 1981). It explores the varied cultural, social, and economic relationships between human

communities and marine environments (Roszko, 2021) and covers a wide range of topics, including seafaring traditions, coastal livelihoods, kinship systems, maritime cosmologies, and governance practices. This field provides insights into how marine spaces are culturally constructed and experienced (Acheson, 1981; McGoodwin, 1990). Maritime anthropology emphasizes how coastal and island communities adapt to their environments and how marine identities and knowledge systems influence human interactions with the sea. Scholars in this area often examine power dynamics, access to marine resources, and the socio-political ramifications of marine policies and conservation efforts (Aswani Canela, 2020; Roszko, 2021).

Meanwhile, fisheries anthropology is a closely related but more specialized subfield that focuses specifically on fishing as a socio-cultural and economic practice. It investigates how fishers manage resources, share ecological knowledge, and respond to environmental and policy changes (McCay & Acheson, 1987; Berkes, 1999). While fisheries anthropology typically concentrates on micro-level practices and governance structures, such as co-management systems, it is intrinsically connected to the broader frameworks of maritime anthropology. Together, these subfields provide a comprehensive understanding of marine-human relationships by integrating cultural, ecological, and institutional perspectives, thereby contributing valuable insights to discussions on sustainability, resilience, and equitable resource governance.

The anthropology of fisheries management evolves around sociocultural, political, and economic processes through which fishers' behaviors about fishing and fisheries management are shaped and reshaped in managing fisheries (Moore, 2012). The interplay among sociocultural and political processes influences the outcomes in

fisheries management (McCormack, 2017b). The preexisting sociocultural and political processes influence or are influenced by fisheries management (McCormack and Forde, 2020; Moore, 2012). Anthropology of fisheries management requires accumulating localized fishing knowledge and practices to address challenges of fisheries SES management for fishers' resilience (Aswani, 2020).

2.2.1 Co-management of Fisheries SESs

Co-management denotes a system of arrangement to distribute power and responsibilities among government bodies and user groups for common resource management (Berkes, 2009; Quimby and Levine, 2018). It provides the space to share roles, perceptions, and learnings among the relevant stakeholders to minimize challenges in co-managing the common resources (Carlsson and Berkes, 2005). Co-management considers social and ecological systems interconnected social-ecological systems (SESs) and shapes SESs to minimize uncertainties and challenges (Armitage et al., 2009). Fisheries should be considered SESs for co-management (Basurto, 2013; Berkes, 2011; Lozano and Heinen, 2016). Although flexible, consistent, and continuing fisheries SES co-management arrangements allow fishers to craft plans, decisions, and reorganizations to address challenges (d'Armengol et al., 2018), the inflexible, inconsistent, and short-term arrangements hinder fishers from adapting to challenges in the co-management of fisheries (Carrillo et al., 2019; London et al., 2017; Ratner et al., 2012).

Some fisheries co-management challenges seem to be inherent in underdeveloped societies (deprivation of rights and participation in management, power relations, conflicts, fishers' marginalization, livelihood insecurity, habitat

damage, declining catches) to impede fishers' adaptive capacity in co-management (Cinner et al., 2012; Jentoft et al., 2018; Kittinger et al., 2013; London et al., 2017; Lozano and Heinen, 2016; Pomeroy and Viswanathan, 2003; Said et al., 2019). These challenges also include the lack of information about fish catch and activities of fishers, the tendency of fishers to overfish for revenue generation, their financial inability, and weak enforcement and inadequacy of institutions to regulate fishing and behaviors of stakeholders (Henry and Johnson, 2015; Ratner et al., 2012; Vaccaro et al., 2013).

2.2.2 Institutional Challenges of Fisheries SESs

The institutions (formal and informal rules) may be contradictory and inconsistent with fishers' necessities and local fishery SES contexts and often restrict expected outcomes and management processes (Jentoft et al., 2009; London et al., 2017). The effectiveness of co-managing a fishery SES can diminish if inconsistencies in property rights protection rules and conflicts in decision-making are not addressed (Pellowe and Leslie, 2020). The contradiction between formal and informal rules often constrains management outcomes in SESs (Rahman et al., 2017). It is hardly possible to manage the fishery for expected outcomes without the active participation of all stakeholders to enforce various multilevel and connected rules, organize activities, and create an atmosphere for working together (Lee et al., 2019; Lozano and Heinen, 2016; Pellowe and Leslie, 2020). The enforcement of rules remains a central challenge induced by the preexisting power imbalances and dispositions to capture resources in fisheries management (Lee et al., 2019; Pellowe and Leslie, 2020; Pinkerton et al., 2014; Salomon et al., 2019).

It is important to devolve the management rights to local fishery user groups to maintain resources and escape unwanted contradictions between state-level and local rules and practices (Lee et al., 2019; Pellowe and Leslie, 2020). The inflexible and conflicting rules to contain management challenges impede fisheries' SES resilience (Lee et al., 2019). Such inconsistencies between rules allow the powerful group of users to capture fisheries and resources (Biswal et al., 2017). The competition to exploit resources from local fisher groups and former leaseholders converts the fishery into a conflict zone in which disintegration and marginalization undermine fishers' adaptive capacity in fisheries co-management (Biswal et al., 2017; d'Armengol et al., 2018; Jentoft, 2017; Kolding et al., 2014; Mamun et al., 2016; Newaz and Rahman, 2019; Njaya, 2007).

2.2.3 Important Factors of Fishers' Resilience

Resilience of fishers needs to include important social and ecological factors for an enhanced knowledge of their ability to adapt to challenges in the fishery co-management (Amarasinghe and Bavinck, 2011; Basurto et al., 2013; Béné et al., 2016; London et al., 2017; Lozano and Heinen, 2016; Marshall and Marshall, 2007; Morgan, 2016). Social factors comprise social settings, community organizations, traditions, formation and implementation of formal and informal rules, shared learning, access to resources, conflict resolution mechanisms, the role of leadership, and economic diversity (Béné et al., 2016; Lozano and Heinen, 2016; Marshall and Marshall, 2007). Moreover, ecological factors comprise the type and productivity of fisheries, species diversity, habitat, harvesting mechanisms, and environmental conditions (Basurto et al., 2013; d'Armengol et al., 2018; London et al., 2017; Lozano and Heinen, 2016; Marshall and Marshall, 2007).