IMPACT STUDY ON COVID-19 IN THE SUNDARBANS RESERVED FOREST (SRF)

List of Acronyms and Abbreviations

BBS	: Bangladesh Bureau of Statistics
BEDS	: Bangladesh Environment and Development Society
BFD	: Bangladesh Forest Department
BLC	: Boat Licensing Certificate
CBOs	: Community Based Organisations
CMCs	: Co-management Committees
CNRS	: Centre for Natural Resource Studies
DFID	: Department for International Development
ECCD	: Early Childhood Care & Development
FGDs	: Focus Group Discussions
FRDCs	: Forest Resource Dependent Communities
HIES	: Household Income Expenditure Survey
IDI	: In-depth Interviews
KG	: Kindergarten
KII	: Key Informant Interview
NGOs	: Non-Government Organisations
ToR	: Terms of Reference
SDGs	: Sustainable Development Goals
SLA	: Sustainable Livelihood Approach
SLF	: Sustainable Livelihood Framework
SMF	: Sundarbans Mangrove Forest
SIZs	: Sundarbans Impact Zones
VCF	: Village Conservation Fora
WASH	: Water Supply and Sanitation

EXECUTIVE SUMMARY

Overview of the Study

COVID-19 outbreaks and lockdown due to the COVID-19 pandemic have created an atmosphere of extreme uncertainty for forest-resource-dependent communities (FRDC). Understanding the impacts of the COVID-19 outbreak and lockdown due to the pandemic, the SMPII (GIZ) developed a package of measures from special funds to alleviate the pandemic's social, economic, and ecological consequences and contribute to biodiversity conservation. Under this project, multifaceted preventive measures have been implemented to improve the situation of the impoverished and resource dependent population, the Bangladesh Forest Department, and the children of resource-dependent households. The preventive measures were built on lessons learned from the preceding project, the Support to the Management of the Sundarbans Mangrove Forests in Bangladesh (SMP II) project. The project has been implemented to strengthen co-management structures in the Sundarbans, emphasising the role of women through conservation and sustainable use of forest resources. Besides, this project also developed the institutional network of poor and marginalised resource dependent communities, particularly women with external organisations by which they also got livelihood assistance during the pandemic time. Therefore, this study evaluates the effectiveness of the mitigation measures adopted by the GIZ in reducing social, economic, political, and environmental disruptions associated with the COVID19 pandemic.

This study adopted a qualitative approach to comprehensively analyse the impact of COVID 19 outbreaks and lockdown on forest resource-dependent communities living around the Sundarbans. Paramount importance was given to qualitative methodology for getting insights over the impact of COVID 19 among the forest resource-dependent communities and their children and organizations involved in the Sundarbans Forest management and conservation. Considering the subjective nature of assessing COVID 19 on the livelihood of the forest resource-dependent communities and biodiversity conservation, an explorative research methodology was chosen that extracted the meaning from unstructured responses during the interviews. Specific methods utilised for the data collection process included secondary data analysis, in-depth interviews, and key informant interviews. 39 respondents from 10 unions (Chila, Nishanbaria, Chadpai, Shundarban, Southkhali, Laudob, Rayenda, Baniyashanta, Dhansagor and Koilashgonj) were selected for data collection. CNRS's project staffs worked as the gatekeepers, and they helped to select the respondents for the interviews.

Findings of the Desktop Study

The existing literatures explain that the life and livelihood of the communities living in and around the Sundarbans depends on the resources offered by the Sundarbans (Lima et al., 2021). Therefore, accessing the natural capital offered by the Sundarbans is the major livelihood opportunity for the forest-dependent communities. Available literature identifies that during the COVID-19 and lockdown period the access to this natural asset were restricted or limited for the forest-dependent communities (Godio, 2020; Golar, 2020 & Lima et al., 2021). This particular situation actually affected the status of other capitals as well. In addition to that, few literatures have identified that households living in and around the Sundarbans are selling different assets (land, livestock etc.) for coping with the difficulties they are facing under the COVID-19 and lockdown situation (Godio, 2020 & Lima et al., 2021). This situation is also worsening the access to natural capital for the forest-dependent communities. However, it has not been documented in the

existing literatures that what alternative coping strategies were in place to restore the access to different natural capital or utilising the exiting access to different natural capital in addressing the adverse impacts of COVID-19 and lockdown situation.

Impact of Covid-19 Pandemic on the Sundarbans and Population Living Around the Sundarbans Reserved Forest

This study identified that out-migration is continuing and the covid-19 situation made this situation worsened. Therefore, considering the population trend, families are losing family members and significant number of cases has been identified where family members of Forest Dependent Communities moved to Dhaka and other cities for securing their livelihood. It has also been identified that the amount of fish and honey Forest Dependent Communities are collecting is decreasing over time and the lockdown situation imposed during the pandemic period affected their abilities to collect resources from the Sundarbans. Regarding the shocks, it has been observed that Forest Dependent Communities are experiencing human health shocks, natural shocks and economic shocks. In addition to that the pandemic situation became a major shock which made the livelihood of the Forest Dependent Communities vulnerable. Lack of medical facility in the area and cost associated with medical treatment often makes the life of Forest Dependent Communities vulnerable. In addition to that lack of income is resulting to mal-nutrition which is also causing health shock. During the Covid-19 situation, it became worsened and made them vulnerable.

This study identifies that lack of alternative income generating opportunities, dependency on the Sundarbans, number of income generating household members are the major cause of economic shock which is resulting into lack of income and making their life vulnerable. In addition to that particularly, the forest dependent communities are facing another economic shock that is locally known as ‘Dadon’. As most of the forest dependent communities are fishermen, they are involved in local customary money lending system. The fishermen are taking loan from local money lenders for hiring fishing boat. Eventually they have to repay the loan by selling fish to these local money lenders. During the pandemic situation as they were not allowed to get pass from BFD and price of the fish reduced due to the lockdown situation, they are facing huge economic shocks to repay the loan.

While analysing the vulnerability of forest dependent communities, seasonality was identified as a major issue. During July and August, due to the breeding season of different fishes BFD does not provide any BLC (Boat Licensing Certificate) which is the permission for fishermen for collecting fish from the Sundarbans. Similar restriction happens in October for Hilsha breeding Season and during January-February for protecting crab breeding season. Therefore, the price and production and employment of opportunity depend on the seasonality issues. During the pandemic period, a handful number of respondents mentioned that BFD did not issue BLC even after the restriction period which affected their livelihood. Moreover, this study identifies that the vulnerability context has been persistent, and the pandemic situation made the lives of forest dependent communities more vulnerable. This vulnerability context eventually affected the status of livelihood capital of the forest dependent communities which has been analysed in the following section. However, the lack of support from different agencies, the recurrent income loss due to price drop of fish and crab during the lockdown period and joblessness during the restriction period are the major effect of pandemic situation that affected the livelihood of forest dependent communities.

Impact of Covid 19 on the Livelihood of Forest Dependent Communities

This study identifies that the forest dependent communities are mostly posing the skills related to forest resources extraction. The professional is very much traditional and most of the forest dependent communities are relying on fishing and crab collection. While asking the respondents about any alternative income generating skill, they informed that

they received training on crab cultivation and duck rearing during the EPASIIAEP project implemented by CODEC and supported by the BFD and UNDP. However, the lack of access to physical assets (access to land for crab cultivation) and the price drop of crab during the lockdown period under the pandemic situation incurred them huge loss in the last cultivating season. It has been also identified that most of the fishermen communities are relying on micro-credits and informal money lending system. However, the gestation period of repayment of micro-credit is also a challenging issue for them. The interest rate of micro-credit and the materialisation time of micro-credit often hinder the income generating activities by the Forest Dependent Communities.

It has been identified that life and livelihood of the forest dependent communities depends on the Sundarbans. Fishing profession for six months is still a major livelihood strategy of a significant number of forest dependent communities. Apart from fishing, honey and collecting the crab are most common resources the forest dependent communities collect from the Sundarbans. During the pandemic period, the access to the Sundarbans was restricted rather than the usual restriction (breeding season of prawn, *hilsha* and crab) which caused lack of income from extracting resources from the Sundarbans. In terms of physical capital, it was identified that source of drinking water and the existing road condition are the major challenges for forest dependent communities to secure their livelihood.

This study identifies that living in the same neighbourhoods for quite long time created the trust and social cohesion among the beneficiaries. It has been observed that the support comes in different form that includes monetary help, land sharing, knowledge sharing and mental support. Apart from the one-to one social relation, the role of CMC was quite vital in institutionalising the form of social capital. Platforms like VCF and PF tried to protect the fishermen form different legal challenges associated with resource extractions from the Sundarbans. However, it has been observed that there is a weak relationship between the Forest Dependent Communities and the local government institutions. This weakening relationship has a direct impact during the pandemic situation as most of the respondents claimed that they haven't received any support from the government organisations during the pandemic period.

Mitigation Measures of GIZ in Addressing the Vulnerability of Forest Dependent Communities and Biodiversity Conservation in the Sundarbans

This study explored the effectiveness of mitigation measures adopted by GIZ in addressing the vulnerabilities associated with Covid-19 and in increasing the functionality of Bangladesh Forest Department and Forest Dependent Communities in ensuring better management process in the Sundarbans. The mitigation measures of GIZ had two foci: first one was increasing the capacity of the community and
Bangladesh Forest Department for promoting better coordination in managing the Sundarbans and the second was supporting the community to address their vulnerabilities. Management of the Sundarbans Mangrove Forests for Biodiversity Conservation and Increased Adaptation to Climate Change Project (SMP) of GIZ started supporting the BFD to better fulfil its role within the co-management structures and at the same time to strengthen the participation of resource users in decision making about the SMF. SMP's support to further development of the co-management approach focused on Chandpai Range of the SMF with 37 VCFs, 1 PF and 1 CMC. SMP collaborated with the local NGO Center for Natural Resource Studies (CNRS) to implement selected activities on the ground.

For involving women in the co-management process SMP formulated women groups under the umbrella of existing co-management structures and implemented capacity development activities to increase women's participation in decision making about the SMF. These activities were beneficial in encouraging the participation of resource users

in the management process of the SRF through VCF, PF and Women group. While conducting the FGDs, it has been observed that the participation of Forest Dependent Communities is now self-actualised, and they are more aware of their right and protecting the biodiversity of the SRF.

The notable achievement that we would like to highlight in describing the major contribution of SMP project of GIZ is acknowledging the inter-generational awareness building in ensuring bio-diversity conservation in the Sundarbans. SMP project has developed 20 study circles and each study circle 30 students are participating. SMP special initiative organised social artwork, organised story writing and drawing competition, conduct mangrove biodiversity observation events, street drama shows on deer poaching & fish poisoning, biodiversity sculpture making, celebrated World Mangrove Day 2021 and published 2 booklets, 1 Ludu, 1 IEC on corona, 2 posters on deer poaching and fish poisoning along with study circle. During the KII, it has been explored that Forest Dependent Communities who are involved in illegal forest resources extraction activities were not aware of the bio-diversity conservation issues and grew with a mentality from their childhood that resources are to be extracted in any means. However, building awareness among the children through study circle programme by introducing a book reading event on the book '*Chorai Chobite Sundarbans'* is an input which might have inter-generational impact in conserving the biodiversity of the Sundarbans.

Apart from the structural measures, during the pandemic situation different incentives were provided for the BFD and forest dependent communities through the SMP. As it has been discussed earlier that all of the respondents claimed that they haven't received any financial or aid support during the pandemic period but the beneficiaries of the SMP received 20 kg of rice, 2 kg pulses, 2 kg oil, 2 kg salt, hand sanitizer, facemask and 1000 BDT cash from the partner NGO- CNRS during the pandemic period. The hand wash stations installed by SMP in different locations helped the personnel of BFD and the local community in preventing the spread of COVID-19 virus and created awareness among the community regarding sanitisation. One key informant claimed that the personal protective equipment for BFD personnel provided by SMP helped the BFD to carry on their everyday activities during the first wave of the pandemic.

Challenges and Way Forward

It has been observed from the study that due to pandemic situation the Forest Dependent Communities were jobless, and they are often facing seasonal unemployment. This study likes to recommend for introducing alternative income generating activities. To do so different skilled based training can be provided to the beneficiary households of SMP project. Before providing the training an assessment of required skill and motivation to be involved in particular AIGAs has to be identified. While conducting the training involving different government agencies and NGOs could be beneficial, as they will be local knowledge hub during the post-project period. Providing soft loans, grants as seed funding could be really beneficial in promotion of AIGAs for the Forest Dependent Communities.

It has been observed that the fishermen communities are solely dependent on local depot and money lenders while selling the fish. In particular during the pandemic situation fishermen were less paid as the national and international supply chains were dismantled. This study recommends for a market study to identify the possible way outs regarding this issue. The possible area of exploration could be introducing storage facilities, linking the marginal farmer with different co-operative-based marketing system.

This study identifies that the number of incidents of using poison for fishing has been increased during the last two years. In this context, this study recommends for automation of permission of fishing and resource extraction from the Sundarbans could

be the key instrument for protecting illegal resource extractions. In addition to that research and development projects could be launched for performing rapid test to detect the fishes that are collected through poisoning. Enhancing the capacity of the BFD will be a key issue in performing this proposed rapid test. Integrating Department of Fisheries of GoB could be beneficial in this process.

This study identifies that under the SMP project GIZ is trying to enhance the capacity of VCF and PF. However, conflicts have been observed in formulating the present adhoc CMC. In this context, this study would like to recommend for a dialogue between the BFD, GIZ and Local Administration to follow the gazette structure for formulating the CMC. Elected representatives from the resource user groups should lead the co-management process. Therefore, the similar democratization process can be followed for each tier of co-management system. To emphasise women participation in the co-management process, the capacity building programme for women group needs continuation. In addition to that a government level negotiation by the development partners can help in restructuring the gazette notified structure of co-management of the SRF to include women group representatives in the current structure.

Engagement of school going children in awareness building activities regarding biodiversity conservation of the SRF is the most remarkable contribution of the project as it is creating a platform for inter-generational awareness building and capacity enhancement opportunities. However, the participants have mentioned that this type of programme can be scaled-up. This study would like to recommend for institutionalising the learning equipment (specially the book) of the study circle programme as a compulsory reading book in the secondary schools in the geographical area adjacent to the Sundarbans.

Under the SMP project of GIZ, the BFD has received drone and other equipment. However, the equipment and trainings offered are not enough to operationalise SMART Patrolling System in its full potential. In this context, this study advocates for capacity building programme for SMART Patrolling System. This study assumes that integrating the GPS based fishing permit will be really instrumental in implementing the SMART patrolling system. The BFD can implement this automation process through the support of GoB and other international development partners.

Upon completion of the study, it has been observed that partnership and collaboration between the BFD and Forest Dependent Communities has not been institutionalised. Although there is a process of responsibility sharing in the current co-management practice but sharing the profit earned by the BFD with the forest dependent communities might be helpful in preventing illegal activities in the SRF. The most significant contribution of this project is engaging children in the awareness building programme. This inter-generational awareness building and capacity building activities can be scaled-up in numbers and through developing an institutionalised structure. Moreover, the participatory co-management system has to be democratized and automated by introducing smart technologies. Building the capacity of the BFD in implementing the automated participatory co-management system will have a sustainable impact in managing the biodiversity of the Sundarbans. Finally, the intergenerational activity like the study circle programme will create a new generation where the resource dependency on the SRF might gradually decrease and introducing AIGAs will be beneficial for the Forest Dependent Communities to secure their livelihood.

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1. INTRODUCTION

1.1 Background of the Study

The COVID-19 pandemic was declared more than a health emergency by the United Nations on 20 May 2020. The economic and social consequences of the pandemic have already increased high levels of vulnerabilities, income inequalities, and food insecurity around the world and would have an extended impact (Ruszczyk et al., 2020). As economies decline, employment and livelihood opportunities would reduce in both the formal and informal sector, contributing negatively to poverty reduction gains and forcing many families into food insecurity, malnutrition, and future health concerns (ibid.). There needs to develop coordinated responses to address both health emergencies and social, economic, ecological, and political consequences and challenges that emerged from the Covid 19 pandemic. Bangladesh is one of the worst affected countries where the pandemic has already hurt the longstanding macroeconomic stability, potentially leading to reversals in poverty reduction gains of the last 15 years (LightCaste Partners, 2020). The pandemic has caused serious consequences on both urban and rural livelihood opportunities due to job loss and other shocks to income and diminished livelihoods (Paul et al., 2021).

Bangladesh reported its first case of COVID-19 on 7 March 2020, and from this date, it is spreading all over the country. Since then, the infection rate has been increased exponentially among the population that the country became on the list of top infected countries in the world (Rahman et al., 2021). As of 28 June 2021, the country had 896,770 cases of COVID-19, and 14,276 people had died from the virus. The government implemented several preventive strategies such as nationwide lockdown, social distancing, contact monitoring, quarantine, and isolation throughout the pandemic situation to address the health emergency. However, it has negative consequences on the country's economy and livelihood of people both engaged in formal and informal sectors. Several researchers already observed a steep drop in income, extreme uncertainty of livelihoods, and a contraction in consumption (Rahman et al., 2020; Ruszczyk et al., 2020; LightCaste Partners, 2020; Paul et al., 2021). Rahman et al. (2020) observed that residents in the informal urban settlements and rural areas had experienced an income drop of 75 percent and 62 percent, respectively. The research further reported that the income shock was evident across all income groups that contribute to shrinkage in food consumption as showing a drop in food expenditure of 28 percent for urban informal settlements, which was 22 percent for rural households. The dependency of the rural population on the natural environment has largely increased to cope with this pandemic situation that led to increased threats of protecting unique nature reserves and rare species.

The Sundarbans Reserve Forest (SRF) has the single largest forest area in Bangladesh, which is 4.1% of the total area in Bangladesh (Abdullah et al., 2016). It is situated in the ancient delta of the Ganges River in southwest coastal Bangladesh and is located around three coastal districts such as Satkhira, Khulna, and Bagerhat districts. The Sundarbans were declared a Ramsar site in 1992, and UNESCO recognised it as a World Heritage

Site in 1997. It has high biodiversity values as it supports various terrestrial and aquatic species, including large and small trees, shrubs, herbs, birds, fishes, reptiles, amphibians, cetaceans, and 16 molluscs. About 35 percent of the total fauna of Bangladesh are found in the Sundarbans (Islam et al., 2018). Therefore, the Sundarbans provide substantial ecosystem services supporting the livelihood of local communities. Rural communities living within 20 km of the Sundarbans are dependent on mangrove forest resources for their livelihood (Islam and Chuenpagdee, 2013). Residents living in the Sundarbans Impact Zones (SEZs) depend on ecosystem services in two ways (Getzner and Islam, 2013): firstly, they lead their livelihood by selling ecosystem products such as fish, honey, and nipa palm, at local (and national) markets; secondly, they also collect substantial subsistence such as food, fresh water, and timber from the forest resources. Along with, approximately 18 percent of the southwestern coastal households living outside the Sundarbans Impact Zones (SEZs) are also dependent on resources of the Sundarbans, for example, fish, shrimp, molluscs, crabs, and medicinal plants (Rahman and Rahman, 2013; Islam et al., 2017). However, forest-dependent communities often face multiple vulnerabilities and challenges that emerge primarily from climate extremes and institutional changes (Lima et al., 2021). They frequently have their houses, equipment, and livelihoods destroyed by cyclones, and climate change has increased the frequency and intensity of cyclones, sea-level rises, and salinity levels that negatively affect coastal livelihoods and Sundarbans' resources (Godio, 2021). Additionally, the government's restrictions regarding collecting forest resources such as fish, nipa leaves, honey, crabs, and wood deteriorated the situation of the forest-dependent communities further, and thereby their livelihood opportunities are expected to decline broadly (Toufique and Yunus, 2013). COVID-19 outbreak and the prolonged nationwide lockdown due to COVID-19 have further aggravated livelihood vulnerabilities and inequalities among the forest-dependent communities and will have an extended impact. However, it remains unclear how the forest-dependent communities face and cope with food, social, economic, and ecological disruptions associated with COVID-19.

COVID-19 outbreaks and lockdown due to the COVID-19 pandemic have created an atmosphere of extreme uncertainty for forest-resource-dependent communities (FRDC) in the Sundarbans by restricting and crippling livelihood opportunities to some extent (Lima et al., 2021). The transportation obstacles, the partial or complete shutdown of local markets for forest produce have caused an extreme decline in demand for the products collected by the FRDC, and thereby, the prices of their products have been mainly dropped. Due to government-imposed travel restrictions and social distancing measures, they could not even go to the markets for several months, leaving most of them with no income (Godio, 2021). Within the COVID-19 situation, the forest dependent communities experienced super cyclone Amphan that damaged communities' crops, infrastructure, coastal protection embankments, and many livelihood options. However, the recovery from the adverse effects of cyclone Amphan was hampered due to COVID-19 outbreaks and the nationwide lockdown, which exacerbated the ongoing hardships that come with existing marginalisation of and discrimination against forest-dependent communities (Godio, 2021).

Furthermore, Lima et al. (2021) stress the health vulnerability of these forest dependent communities in the context of the COVID-19 pandemic as they have little or no information regarding the possible health-related threat that occurred COVID-19. Another negative consequence reported due to the COVID-19 pandemic is the school's mental health as the schools have been closed since the beginning of 2020 when the COVID-19 outbreaks in this country. The social consequences of the COVID-19 pandemic, such as school dropouts, child marriages, are expected to increase. The COVID 19 became an unprecedented shock for the forest-dependent communities that tends to reinforce existing social, economic, political, and environmental stress and challenges (Chattopadhyay, 2021). There is a need to understand how and to what extent this pandemic has affected and affect the lives and livelihoods of the forest dependent communities. Therefore, this research will attempt to explore the impact of the COVID-19 outbreak and lockdown the livelihood choices and daily lives of the population living 5 km around the Sundarbans. The forest management is also affected during the COVID-19 outbreak, and the nationwide lockdown as illegal fishing, poison fishing, and illegal extraction of other resources such as honey, fuelwoods has also been increased. Lima et al. (2021) reveal that the COVID-19 pandemic situation forced people to engage in illegal fishing and poison fishing, regardless of their knowledge of the adverse effects of these activities on biodiversity conservation. Therefore, this research will explore how forest-dependent communities are coping with the food, social and economic disruptions associated with COVID-19 and the extent to which they negatively impacted biodiversity conservation.

Understanding the impacts of the COVID-19 outbreak and lockdown due to the pandemic, the SMPII (GIZ) developed a package of measures from special funds to alleviate the pandemic's social, economic, and ecological consequences and contribute to biodiversity conservation. Under this project, multifaceted preventive measures have been implemented to improve the situation of the impoverished and resource-dependent population, the Bangladesh Forest Department, and the children of resource-dependent households. The preventive measures were built on lessons learned from the preceding project, the Support to the Management of the Sundarbans Mangrove Forests in Bangladesh (SMP II) project. The project has been implemented to strengthen co-management structures in the Sundarbans, emphasising the role of women through conservation and sustainable use of forest resources. Besides, this project also developed the institutional network of poor and marginalised resource dependent communities, particularly women with external organisations by which they also got livelihood assistance during the pandemic time. Therefore, this research will evaluate the effectiveness of the mitigation measures adopted by the GIZ in reducing social, economic, political, and environmental disruptions associated with the COVID19 pandemic. The role of the combined measures will be assessed to understand how effective the measures are to address women empowerment (SDG-5: Gender equality) and achieve SDGs of management and improvement of the aquatic sector (SDG14- life below and SDG16- life above water).

1.2 Aim and Objectives

The aim of the assignment is to understand the impact of COVID-19 on the Sundarbans and forest-dependent communities living around the Sundarbans and strengthen mitigation measures to alleviate negative effects of the COVID-19 on the livelihoods of the forest-dependent communities and improve conservation of the Sundarbans Reserved Forest (SRF). Considering the aim, the impact analysis has set the following specific objectives:

- To explore social, economic, political, and environmental consequences of the COVID-19 pandemic on the Sundarbans and population living around the Sundarbans Reserved Forest (SRF).
- To assess the extent to which COVID-19 pandemic has affected and going to affect the lives and livelihood of the community entirely dependent on small-scale fisheries (inland and marine) and other riverine as well as forest resources for their subsistence.
- To assess the effectiveness of COVID-19 mitigation measures adopted by the GIZ in increasing functionality of the BFD, preventing of poaching and other practices relating to illegal forest resources extraction, smoothing of food security of extreme poor households, improving mental health of the children, and supporting children education during pandemic situation.
- To explore the gaps in the mitigation measures that have already been implemented for the communities living around the Sundarbans and ensuring biodiversity conservation in the Sundarbans.
- To recommend some strategies to strengthen the mitigation strategies that would have co-benefits of livelihood enhancement and conservation outcomes.

2. CONCEPTUAL FRAMEWORK

This research intends to assess the impacts of COVID 19 on the livelihoods of forest resource-dependent communities. The impact of livelihood is not just an analysis of the forest resource-dependent communities' income generation, but it encompasses people's capabilities, assets, and activities mediated by institutional and organisational arrangements to the necessities of life. (Chattopadhyay, 2020). This research considers a sustainable livelihood framework to understand the livelihood of forest resource-dependent communities amidst COVID-19 disease outbreaks and lockdown to address the outbreak. Sustainable livelihoods approach (SLA) is a holistic view of the problems of vulnerability and poverty and ways of tackling those problems, in which poor people and their priorities are placed at the centre of the development process (Carney, 1998, 2002). The SLA is a multidimensional approach that involves the assessment of households' assets and the livelihood strategies they undertake to make livelihood outcomes such as food security, household wellbeing, livelihood resilience. It considers as a pragmatic understanding of the forest resource-dependent households' livelihood and what drives livelihood vulnerable or resilient situation. Thus, the SLA helps us to determine the extent to which vulnerability, assets, policies, and institutions affect forest resource dependent households' livelihood. This research will apply the SLA to investigate how a forest resource-dependent household, in a socioecological context, utilise a range of resources with given institutional arrangements to develop a resilient livelihood in the context of COVID 19 situation. Hence, following Scoones (1998), it analyses how the forest-dependent households within a given socio-ecological context combine livelihood resources and strategies that will result in an outcome that enhances their livelihood resilience. The SLA often emphasises on factors regarding vulnerability, level, and extent of households' access to assets, structures and processes that influence the access, and the portfolio, combination, and dynamism of livelihood strategies (Appiah, 2017). This research has modified the existing 'sustainable livelihood framework' (e.g., Bebbington, 1999; DFID, 1999; Scoones, 1998) to understand how COVID-19 pandemic situation affects forest dependent households' assets, livelihood activities and limit livelihood opportunities which might have several consequences such as food insecurity, health risks, income shocks, disruption of children education, overexploitation of forest resources, etc. Using the framework also helps to reveal the extent to which institutional and organisational support to build resilience of forest resource-dependent communities against COVID 19 pandemic situation and conservation outcomes. The modified sustainable livelihood framework shown in Figure 1 is based on the five thematic pillars linked to one another including vulnerability context, livelihood assets in the form of a pentagon, institutions, structures and processes which combine and transform the asset base, livelihood strategies and the livelihood outcomes. Each of these is discussed in turn to provide the overall conceptual framework.

2.1 Vulnerability Context of SLA

The social, political, economic, cultural, and environmental conditions faced by the forest resource-dependent households and communities define the opportunities and constraints existing at a time. The factors that make up the vulnerability context are essential because they directly impact peoples' assets and options available to them in

pursuit of beneficial livelihood outcomes (DFID, 1999). The sustainable livelihood framework assesses household livelihood vulnerability concerning shocks, trends, and seasonality (DFID, 1999). Shocks refer to the unpredicted events which destroy assets directly. Living around the Sundarbans, forest-dependent households have to face multiple shocks and stresses, including natural disasters (such as cyclones and tidal surges, river erosion), crimes (burglary, arrested or criminal case got because of illegal fishing/extracting forest resources), health shocks; sudden attacked by wild animals and political eviction from a shelter. Trends are predictable occurrences in nature that bring about changes over a period. These include declining fish stock, national and international economic trends, or technological trends. Seasonality also refers to price fluctuations, fish-catching seasons, or food availability (Appiah, 2017). Additionally, the framework postulates the possibility of differences in vulnerability faced by people due to other factors such as debt of informal lenders and recommends that assessing livelihoods an inside-out comprehension of the nature of vulnerability must be considered (DFID, 1999).The COVID-19 has become an unprecedented shock, and it tends to reinforce the existing socio-economic-political and environmental stresses in the lives and livelihoods of forest resource-dependent communities. As the countrywide lockdown and movement restrictions continue to support the health response, livelihood choices, and daily lives in the Sundarbans Impact Zones (SIZs) have already experienced different economic, social, and ecological stresses will be aggravated in the future. The cyclones Amphan and Yass, which struck Bangladesh during the lockdown, made it difficult for the forest resource-dependent communities to cope with the evolving livelihood crisis. The SLA helps to understand forest resource-dependent communities' exposure, risks, and unsustainable resource-dependent livelihoods amidst COVID 19 pandemic. It explores demographic, social, economic, and physical vulnerabilities among forest resource-dependent communities. Additionally, it also identifies how livelihood choices during pandemic situations are related to ecological stresses.

2.2 Livelihood Capital Assets

Capital assets refer to resources that help an individual to survive. People combine the capital endowments that are available to them and which they have control over to create their livelihoods. These include personal capabilities, tangible assets (for example, stores and material resources) and intangible assets (claims and access) (Chambers and Convey, 1992). According to the Sustainable Livelihood Framework (DFID, 1999), a livelihood is supported by five livelihood capital assets, namely, natural, social, financial, physical, and human capital.

Table 2.1: Definition of Urban Livelihood Assets

Assets	Definitions
Social and political capital	Social capital refers to networks, norms and culture that enable people to act collectively. This indicates the features of social capital such as trust and reciprocity which can become a resource bank for the vulnerable and the marginalised communities to act collectively for their well-being. Rakodi (2002) mentions an important distinction of social capital; focusing on whether social capital is built on informal networks or social capital that is derived from participating in formal market arrangements, whilst the wider political system and civil society organisations can be treated as political capital. The former can be considered as social capital and latter is political capital. The political capital can be seen as a 'gatekeeper asset' for the poor that permit or prevent accumulation of other assets (Booth et al., 1998, p. 79).
Human capital	Human capital is defined as the health situation, which determines people's capacity to work, and skills and education determining the returns to their work.
Physical capital	In the urban context, physical capital can be defined as the basic infrastructure (transport, shelter, water, energy, and communications) and the production equipment which people need to pursue their livelihoods.
Financial capital	Financial capital is defined as financial resources (savings, credit, remittances, and pensions), which reflects a wider range of ways in which households build up financial reserves (or experience vulnerability). In the context, access to financial assets is important for survival and managing risks at the household level because urban economies have highly commoditised.

Source: Booth et al. (1998); Rakodi (2002); Moser (1998) & Woolcock (2000)

An Asset-based approach states that household well-being is multi-dimensional and directly linked to command over assets and livelihood strategies (Moser, 2006; Heltberg et al., 2009). Household decisions to accumulate and allocate assets are often called their livelihoods strategy, and access and returns to their asset portfolio are profoundly influenced by the external policy and institutional context, and by risks (Heltberg et al., 2009). This research will explore what assets have been eroded and which assets and capabilities the forest resource-dependent households can utilise to build their survival strategies or coping strategies in the COVID 19 pandemic.

2.3 Policies, Institutions and Processes

In the sustainable livelihood framework (SLF), institutions or structures refer to organisations both public and private that set and implement policies and legislations; deliver services; make further livelihood opportunities to get access to assets and perform all manner of functions that affect livelihood. The SLA puts institutions at the center of livelihood analysis and shows how individuals and households are facilitated or constrained in their efforts to construct sustainable livelihood by institutional arrangements. Most often, the access of individuals, households, and communities to the various types of capital are determined by institutional rules and social norms. Thus, this study finds out to answer the following two questions: what institutions exist? How

do they mediate access to capitals? Specifically, this research will evaluate the role of the COVID 19 mitigation project in mediating access of forest resource dependent households to different livelihood assets and build livelihood strategies. Therefore, it will assess the humanitarian assistance of the project in improving food consumption of the forest resource-dependent communities. The research also evaluates how effective are the COVID 19 mitigation project and Support to Co-management in the Sundarbans Mangrove Forest projects to build institutional networks for facilitating livelihood assets and strategies. Additionally, this research assesses the role of these projects above in improving the functionality of the Bangladesh Forest Department during the pandemic situation and increasing awareness of the school-going children regarding biodiversity conservation that contribute to socio-ecological systems.

2.4 Livelihood strategies

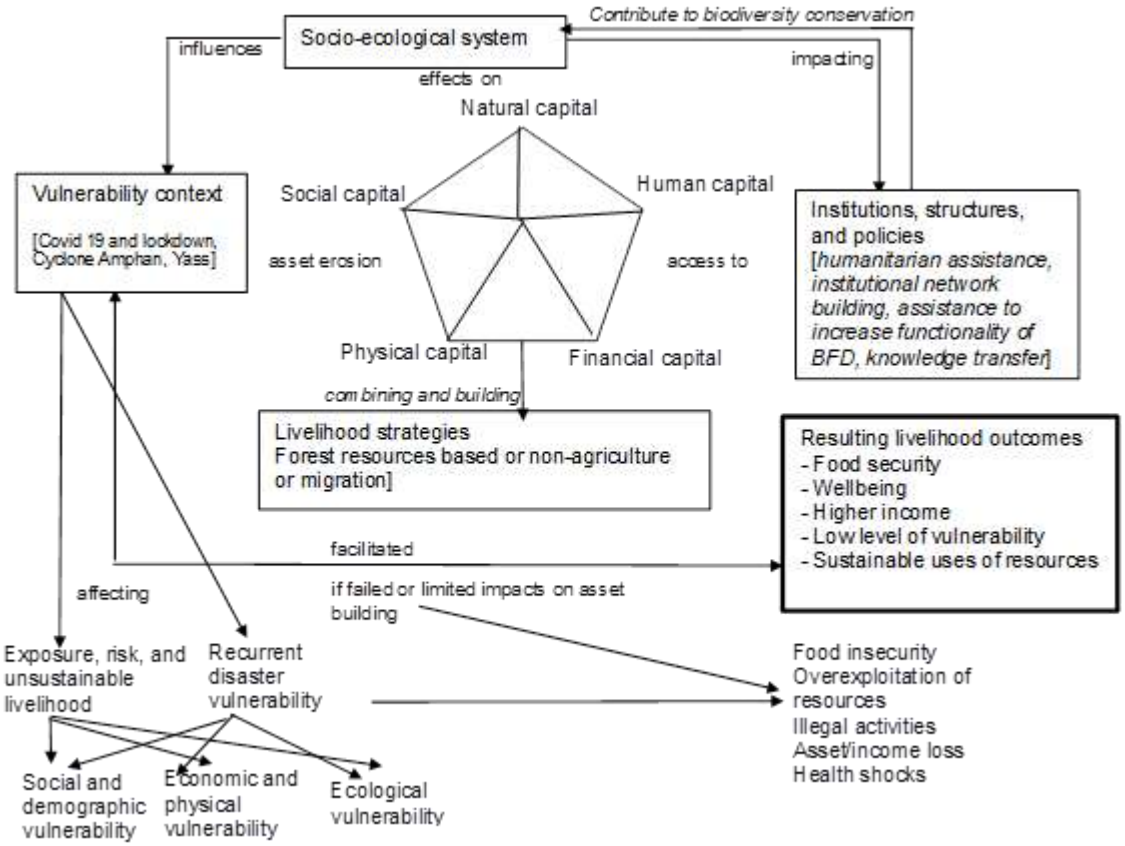
A livelihood strategy refers to how forest resource-dependent households combine and use their resources to make a living, given the constraints and opportunities available to them during the COVID 19 pandemic situation. The combination of the vulnerability context, the livelihood capital assets, and the institutional context within which the individual life to a large extent influences the portfolio of activities an individual can engage in to earn a living (DFID, 1999). Livelihood strategy is most often used interchangeably with coping strategies. Coping strategy is a mechanism adopted by individuals amid livelihood crisis while livelihood strategy represents the portfolio of activities that individuals engage in to make a living (DFID, 1999). The SLA postulates what livelihood strategies that the forest resource dependent households and groups develop which exposing to shocks and other livelihood stresses. They may adopt different livelihood strategies based on their resources and the level of risk associated with the alternative options, to generate more income, reduce their vulnerability and improve their wellbeing (DFID, 1999; Scoones, 2009). However, diversifying into the different portfolio of livelihood activities will not automatically lead to livelihood security (Appiah, 2017). It is essential to analyse livelihood outcomes in the lens of livelihood sustainability indicators. It also helps to understand what assets and supports forest resource dependent households need to make their livelihood resilient. Table 2.2 shows indicators to be used to assess the extent to which livelihood sustainability is achieved through the development of alternative livelihoods.

Table 2.2: Indicators to Identify Livelihood Sustainability

Improved economic conditions	Greater political recognition	Increased social wellbeing	Improved environmental conditions	Enhanced living conditions
Full access to income generating activities	Full participation in community decision making	Full access to children education	Full access to basic services (water and sanitation)	Good quality of housing
Improved ability to serve	Heightened awareness of political rights	Full access to healthcare	Adaptation practices	Full access to open & communal space
Least dependency on natural resources	Institutional engagement	Improved perceptions of safety and security	Access to support of disaster preparedness	
Affordability to maintain costs of services	Favourable rules, norms and conventions	Strengthened social networks		
Access to market				

Source: modified from Rahman (2012)

Figure 2.1: Livelihood framework



Source: modified from DFID (1999)

3. RESEARCH METHODOLOGY

3.1 Introduction

This research has adopted a qualitative approach to comprehensively analyse the impact of COVID 19 outbreaks and lockdown on forest resource-dependent communities living around the Sundarbans. Paramount importance was given to qualitative methodology for getting insights over the impact of COVID 19 among the forest resource-dependent communities and their children and organizations involved in the Sundarbans Forest management and conservation. Considering the subjective nature of assessing COVID 19 on the livelihood of the forest resource-dependent communities and biodiversity conservation, an explorative research methodology has been chosen that extracted the meaning from unstructured responses during the interviews. Specific methods utilised for the data collection process included secondary data analysis, in-depth interviews, and key informant surveys. An open-ended checklist/survey format was used for all the qualitative survey instruments, including indepth interviews and key informant surveys. Through the qualitative research design, this study also intends to explore children and adolescent's situations in the context of the COVID 19 pandemic, and therefore interviews with children and their parents have been also considered.

3.2 Desk Study

The desk review has been conducted to understand the impact of COVID 19 pandemic on lives and livelihood of forest resource dependent communities and Sundarbans biodiversity conservation. For this, different secondary sources such as book chapters, journal articles, newspaper articles, websites, and organizational reports have been considered to understand the impact of COVID-19 pandemic situation on the Sundarbans and population living around the Sundarbans. To find out the secondary sources, google and also google scholar has been used and the following search options have been applied to identify relevant secondary sources:

[*impact of COVID 19 on lives and livelihood of forest resource-dependent communities* AND *Sundarbans biodiversity conservation* OR *impact of COVID 19 on fishing communities* OR *fishing resources* AND *impact of cyclones Amphan or Yass on Sundarbans and communities around Sundarbans* AND *COVID 19 and cyclone impact on Sundarbans*]

From all the secondary materials, relevant texts have been identified for qualitative content analysis. The purpose of the content analysis is to identify patterns in the selected texts. A common starting point for qualitative content analysis is to condense the texts into manageable lengths for coding. The objective of the condensation is to systematically transform a large amount of text into a highly organised and concise summary of key results. The next step is to label condensed meaning units by formulating codes and then grouping these codes into categories. It will go further from categories to themes which are the highest level of abstraction for reporting results. Using the themes, the review results reveal the impact of the COVID-19 outbreak and lockdown on the lives and livelihood of forest resources-dependent communities and identify whether

the livelihood choices and daily lives negatively impact biodiversity conservation in the Sundarbans.

3.3 Study Area

This research considers forest resource-dependent communities living in the Chandpai and Saronkhola range of the Sundarbans to understand the impact of the COVID 19 pandemic situation. Chandpai and Saronkhola are distributed in the two districts, such as Khulna and Bagerhat. The forest resource-dependent communities are distributed into four Upazilas and ten Unions (see Table 3.1 and Map 3.1).

Table 3.1: Study Area

District	Upazila	Union	Range
Bagerhat	Mongla	Chandpai	Chadpai Range
		Chila	Chadpai Range
		Sundarban	Chadpai Range
	Morrelgonj	Nishanbaria	Sarankhola Range
	Saronkhola	Dhansagar	Sarankhola Range
		Rayenda	Sarankhola Range
		Southkhali	Sarankhola Range
Khulna	Dacope		
	Banisanta	Chadpai Range	
		Laudobe	Chadpai Range
		Kailashganj	Chadpai Range

Mongla is the largest Upazila of Bagerhat District in respect of the area, and it occupies an area of 1461.20 sq. km. of which 1083 sq. km. is the reserve forest. It lies between $21^0$49´ and $22^0$33´ north latitudes and between $89^0$32´ and $89^0$44´ east longitudes (BBS, 2014a). The Upazila consists of one Paurashava, nine wards, six Unions, twenty-eight mauzas, and eighty-three villages. From six Unions of the Mongla Upazila, three Unions within the Chandpai range have been considered, and twenty-one communities or village conservation forums (VCFs) are selected as the study area in these three Unions. Within 21 VCFs, 3198 households solely forest resources dependent has been selected as the beneficiary households (see Table 3.1).Morrelganj is the biggest Upazila of Bagerhat District regarding population, an area of 460.90 sq. km. with 235.24 sq. km. —reserved forest area. It lies between $22^0$20´ and $22^0$37´ north latitudes and between $89^0$42´ and $89^0$58´ east longitudes (ibid.). This Upazila has 16 Unions, but one Union Nishanbaria has been selected as the study area. In Nishanbaria Union, five communities or VCFs have been considered where 778 households have been selected as the beneficiaries (see Table 3.2).Sarankhola is the second largest Upazila of Bagerhat District regarding the area. The Upazila occupies a total area of 756.60 sq. km. including 594.58 sq. km. forest area. It is located between $22^0$13´ and $22^0$24´ north latitudes and between $89^0$46´ and $89^0$54´ east longitudes (ibid.). The Upazila has four Unions and from four Unions, three Unions such asDhansagar, Rayenda, and Southkhali have been selected as the study area. From these three Unions, twenty-five VCFs or communities have been considered as the beneficiaries. Among the communities, 4269 (distribution

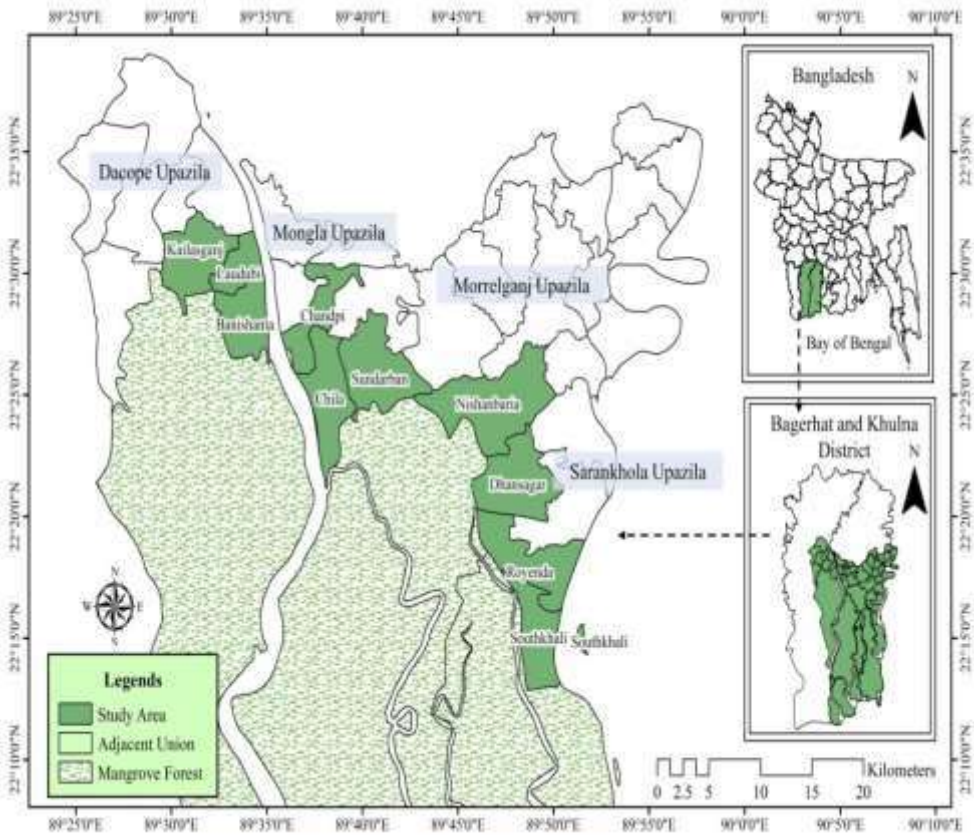
list/database) forest resource-dependent households have been selected for distributing humanitarian assistance from the COVID 19 mitigation project (see Table 3.2). Dacope is the second biggest Upazila of Khulna District occupies an area of 991.56 sq. km. including 494.69 sq. km.reserve forest area. It is located between 22°24' and 22°40' north latitudes and between 89°24' and89°35' east longitudes (BBS, 2014b). The Upazila consists of nine Unions, but three Unions Banisanta, Laudobe, and Kailashganj have been selected as the study area. Six VCFs or communities and 1029 beneficiaries have been considered from selected three Unions (see Table 3.2).

Table 3.2: Distribution of VCFs and Households by Different Geographical Units

District	Upazila	Union	No. of VCFs/ communities	No. of Households/ beneficiaries
Bagerhat	Mongla	Chandpai	3	509
Bagerhat	Mongla	Chila	9	1685
Bagerhat	Mongla	Sundarban	9	1004
Sub-Total			21	3198
Bagerhat	Morrelgonj	Nishanbaria	5	778
Bagerhat	Sarankhola	Dhansagar	4	766
Bagerhat	Sarankhola	Rayenda	9	1129
Bagerhat	Sarankhola	Southkhali	12	2374
Sub-Total			25	4269
Khulna	Dacope	Banisanta	4	785
Khulna	Dacope	Laudobe	1	135
Khulna	Dacope	Kailashganj	1	109
Sub-Total			6	1029
Grand Total			57	9274

Source: Concept Note on COVID-19 mitigation measures for the Sundarbans

Figure 3.1: Study area



3.4 Qualitative Data Collection Tools

This research has adopted a qualitative research design that is committed to the "…interpretive understanding of human experience… the field is inherently political and shaped by multiple ethical and political positions" (Nelson et al., 1992:4). It is an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. Adopting qualitative research design, impact analysis involves emerging questions and procedures, data typically collected in the participant's setting, data analysis inductively building from particulars to general themes (Creswell & Creswell, 2017). The research considered several qualitative methods such as in-depth interviews, focus-group discussion, and key-informant interviews. Under the in-depth interviews, interviews with forest resource-dependent households, primary and secondary level students, and parents were considered.

3.4.1 In-depth interviews (IDIs)

This impact study conducted 39 in-depth interviews of forest resource-dependent households and these households were selected from ten Unions. Although, from each Union, five interviews were planned to conduct before the fieldwork, it was possible to complete interviewing five respondents from all the ten Unions because of applying other qualitative tools like FGDs and KIIs simultaneously. The CNRS's project staffs worked as the gatekeepers, and they helped to select the respondents for the interviews. Table 3.3 shows distribution of respondents by different Unions. Among the respondents, 89.74% of the male respondents were selected for interviewing whereas 10.26% of the female respondents were selected (see Figure 3.2). Table 3.4 shows age distribution of

the respondents. It is found that most of the respondents (51%) have selected from the age group of 41 to 50 years whereas 18% of the respondents were selected from the age group of 51-60 years. The remaining respondents are from the three age groups: 31-40 years (17.95%), 61-70 years (7.69%), and 71-80 (5.13%).

Among the respondents, most of the respondents (59%) don't have any formal schooling whereas 25% of the respondents can have some years of formal schooling which is limited to five years. The remaining 15.38% of the respondents have a formal education between 6 to 10 years (see Figure 3.3). In case of marital status, most of the respondents (nearly 90%) are married whereas 8% of the respondents are widow. The rest one respondent was found in the never married category (see Figure 3.4). Table 3.5 shows primary occupation of the respondents, and it is found that 72% of the respondents have fishing as the primary occupation whereas the crabber was found as the second highest occupation. The remaining respondents were found in different occupations such as labouring in the business enterprises (2.56%); unpaid household work (5.13%); honey hunter (2.56%); rickshaw/van pulling (2.56%); and others (2.56%).

Table 3.3: Distribution of respondents by Unions

Union	Frequency	Percentage
Chila	6	15.38
Nishanbaria	4	10.26
Chadpai	4	10.26
Shundarban	4	10.26
Southkhali	3	7.69
Laudob	3	7.69
Rayenda	5	12.82
Baniyashanta	4	10.26
Dhansagor	2	5.13
Koilashgonj	4	10.26
Total	**39**	**100.00**

Table 3.4: Respondents' Age Group

Age Group	Frequency	Percentage
31 - 40	7	17.95
41 - 50	20	51.28
51 - 60	7	17.95
61 - 70	3	7.69
71 - 80	2	5.13
Total	**39**	**100.00**

Figure 3.2: Sex of the respondents

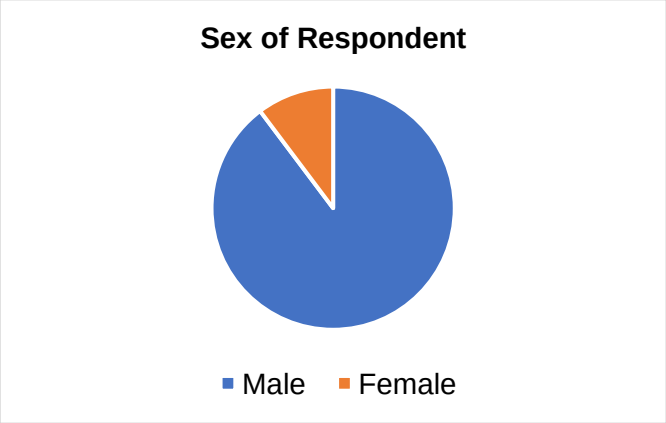


Figure 3.3: Years of education of the respondents

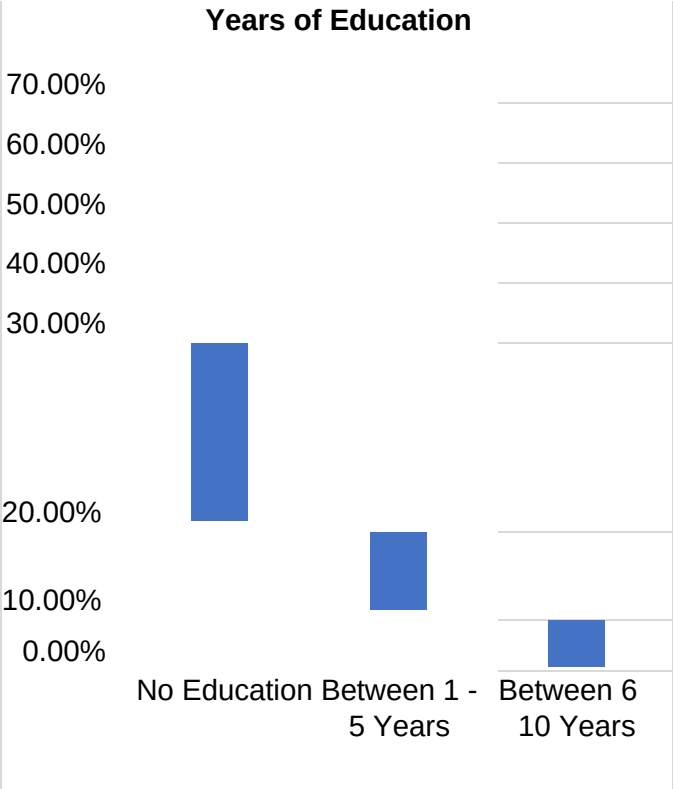


Figure 3.4: Marital status of the respondents

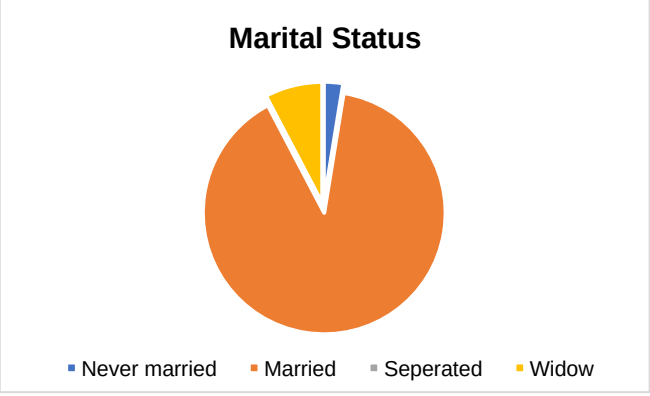


Table 3.5: Primary Occupation of the Respondents

Primary Occupation	Frequency	Percentage
Fishing	28	71.79
Business owner using hired labour	1	2.56
Unpaid household work	2	5.13
Honey hunter	1	2.56
crabber	5	12.82
Rickshaw/Van Puller	1	2.56
Others	1	2.56
Total	39	100.00

The in-depth interviews were divided into two parts: a rapid assessment survey and an in-depth discussion regarding the impacts of COVID 19 outbreaks and lockdown. In the rapid assessment survey, interviews highlighted the COVID-19 and lockdown impacts of the two and half months (e.g., June 2021- August 2021) on their daily lives and livelihoods in terms of health vulnerability, access to food, dietary changes, income or asset loss, credit burden, access to assets or humanitarian assistance, institutional changes, and illegal practices. Additionally, the in-depth assessment considers analysing the situation that the forest resource-dependent households have been facing since the beginning of 2020, when the COVID 19 pandemic took considerable proportions and had serious consequences for these people. The following issues were consulted in the in-depth assessment of the impacts of the COVID 19 pandemic.

- The impact of COVID-19 lockdown on their lives and livelihoods in terms of economic consequences such as access to food, food consumption and food coping strategies, changes in income-earning opportunities, income loss and financial burden, increase of informal lending, food price rises, etc.
- The social consequences on the forest resource-dependent households are domestic violence, violence against women and children, child marriage, and nutrition and health vulnerability.
- Intersectionality shapes the differentiated nature of the impact of COVID 19 among forest resource-dependent communities.
- The political and institutional consequences (e.g., delay in providing BLC, rent seeking behaviour) exacerbate forest resource communities' vulnerabilities.
- The impact of COVID 19 lockdown on illegal practices regarding extraction of forest resources and reasons behind these illegal practices.
- The impact of school shut down due to COVID 19 on school-going children and their families.
- The effectiveness of institutional and organisational interventions in developing coping strategies of the forest resource-dependent communities.

In case of interviewing of the school-going children, the impact study conducted interviews with small groups. The impact study formed five small groups and a total of fifteen children were considered for interviewing. Each group has three children of similar age-group and academic class. The study considers two groups from class 5 to 6 where

three groups were selected from class 7 to 8. Additionally, these interviews were conducted to understand the effectiveness of the mitigation measures undertaken by the project, entitled '*COVID-19 mitigation measures for the Sundarbans*' in increasing awareness regarding resource management of the Sundarbans, stopping child labour, and restoring children education, stopping children marriage and children's illegal practices regarding Sundarbans' resources. Along with children's interviews, this study also conducted two interviews with parents to understand the project's impacts on children. The BEDs' project stuffs worked as the local gatekeeper that helped us to select these children and parents. While undertaking children's interviews, peers were considered, and the parents' responses were undertaken separately.

3.4.2 Key Informant Interviews (KIIs)

This technique allows the researcher to select several individuals who have knowledge and experience or are directly involved in forest management and biodiversity conservation. The main purpose of the key informants' survey is to understand the impact of COVID 19 on forest management and biodiversity conservation. Additionally, the interviews also helped us to understand the effectiveness of the measures undertaken by the project of COVID 19 mitigation measures in ensuring forest management and biodiversity conservation functionality. Further, the key informant interviews were also used to validate in-depth interviews' findings. Therefore, this research had dialogues with the Bangladesh Forest Department representatives, members from co-management committees, Union Parishad Members or Chairmen, partner NGOs (e.g., CNRS and BEDS), and experts working in the SMP I and II. The research conducted 12 KIIs. Besides looking at impacts of COVID 19 on the Sundarbans, the key informants' survey also explored how the mitigation project helped to continue BFD's operation under the pandemic situation. Also, it identified whether the project has any gap in ensuring health safety of front-line workers of the BFD and range offices and stations from where the front-line workers deliver different services, including forest patrolling, issuing resource use permits (on a limited scale), checking gears/gadgets used for harvesting resources, and counting or weighing harvested resources, collect revenues, issuing clearances to harvesters, etc. even under the pandemic situation.

3.4.3 Focus group discussions (FGDs)

The focus group discussion is a widely used method in participatory research to get an in-depth understanding of the broad community context and social complexities. The two most important elements of a focus group discussion are the 'group' situation and an interesting 'topic' to ensure interaction between the group members (Bedford and Burgess, 2001). The focus group discussions technique was used in this impact study because it is argued by scholars such as Morgan (1997) that it is ideal for researchers committed to effecting social change and empowering the researched. This impact study conducted four FGDs in two Sundarbans Ranges and two FGDs from each Range were organized to have dialogues. In the FGDs, PF members, members of the CMEC, and members of the VCFs participated. Both male and female members participated in the FGDs. The CNRS's SMP project stuff helped us to identify FGDs' participants and also invited them and organized the group meeting in the participant's desired locations. Total

forty-eight participants attended in the four FGDs and in each FGD, twelve members joined in the group discussion. Each of the group discussion sessions lasted for about one and a half to two hours. and all the group discussions were recorded with a digital tape recorder. The purpose of the FGDs is to understand the impact of COVID 19 on the communities' livelihood choices around the Sundarbans under the pandemic situation and their relationship with biodiversity conservation. Additionally, it also evaluated the role of the mitigation project as well as the SMP I & II in addressing the livelihood needs of forest resource-dependent communities and biodiversity conservation.

3.5 Data management and data analysis strategies

The process of organising the qualitative data was to review each datum collected at the end of each day. This process started and continued alongside the survey. The researchers identified gaps in the surveys and solved these in at the end of each day. The researchers downloaded the recorded interviews onto a computer and replayed them to write down narratives of the interviews and generated necessary figures from the interviews that allowed the researchers an opportunity to validate the information and filled in the gaps in the interviews. Information gathered from FGDs and transcripts from interviews and key informants' surveys and researchers' field notes were organised under themes and nodes. A 'Thematic Analysis' was carried out using the interviews and group discussions data to explore the broader notion of the impact of COVID 19 and lockdown on lives and livelihoods of communities living around Sundarbans. As a part of that, the initial step was a preliminary reading of all transcripts from the primary data concerning the research questions from the various sources. From the initial reading, themes were developed, which would be used as a foundation to build upon for further development. In building upon the themes developed, detailed categories were generated manually, which enabled the researchers to organise data in different ways, particularly with subcategories. Then, the research applied coding for themes, categories and subtopics or categories to organise the primary data come from the fieldwork. Coding is essential because it helps to explore the categories from the data. With the coded data, the information was reviewed several times while quotations from the interviews were noted. The data were studied to identify themes and concepts from the literature. Later, the researchers reviewed the research questions and analysed the data to identify various themes and categories necessary for answering the research questions.

3.6 Quality assurance

This research adopted triangulation which improves the validity of qualitative findings.
In this study, triangulation compares the results from either different qualitative method (for example, interviews and desk study) or, more simply, two or more data sources (for example, interviews with different stakeholders). It looks for patterns of convergence to develop or corroborate an overall interpretation. At the later stage of data collection, the study team organised dialogues with key informant interviews (KIIs)for broader testing of findings. While data collection, all respondents were fully be informed of the nature of the research and to give informed consent before the interview. Subjects were given a plain

language statement of the nature and purpose of the research. No interview should be recorded without the permission of the respondent.

4. DESK STUDY FINDINGS

The desk study findings to identify the impact of COVID 19 on lives and livelihood of forest resource-dependent communities in the Sundarbans has been conducted on selected published scholarly articles and popular articles. Although the number of published literature is very limited in identifying the impact of COVID 19 on lives and livelihood of forest resource-dependent communities in the Sundarbans due to the time period the phenomenon has emerged, but still the available literature has focused few critical issues. These issues have been analysed in this desk review to identify different pattern among those literatures. To illustrate the themes all of the literature were categorised. The major challenge for developing the themes from the available literature was the diversity of analytical/conceptual framework/viewpoint deployed in those literatures. In few literatures, authors tried to identify the impact of COVID 19 on lives and livelihood of different forest resource-dependent communities that includes fishermen communities, crabbers, honey hunters and nipa leaf collectors etc. In other literature, authors tried to identify different sectors of economy that includes fishing and tourism. Few literatures tried to unpack the impact focusing different social and economic aspects. In this context, this study focused on the themes of the conceptual framework that has been used in this study. Therefore, the status of social, human, natural, physical and financial capital of forest dependent communities will be the major themes of the desk study findings to identify the impact of COVID 19 on lives and livelihood of forest resource-dependent communities in the Sundarbans.

The most relevant literature in identifying the impact of COVID 19 on lives and livelihood of forest resource-dependent communities in the Sundarbans is a book chapter titled as “Livelihood and health vulnerabilities of forest resource-dependent communities amidst the COVID-19 pandemic in south-western regions of Bangladesh” published in the book “Environmental Resilience and Transformation in Times of Covid-19: Climate Change Effects on Environmental Functionality”. In this book chapter, authors identified the impact of COVID 19 on different forest resource dependent communities. They have identified that among the forest dependent community, fishermen community were adversely affected by COVID-19 and the lockdown situation. This paper identifies that, during the lockdown situation fishing permits were not issued. Therefore, it affected the lives and livelihood of the fishermen communities.

In this book chapter, authors have portrayed the similar impacts of COVID-19 and the lockdown situation of the fishermen communities while explaining the situation of the crabbers. In the research, the authors have interviewed the crabbers from Mongla, Bagerhat and Shyamnagar, Satkhira region of the Sundarbans. They summarised the impact as follows: before COVID-19, the crabbers could maintain their families by harvesting crabs from the Sundarbans. But during COVID-19, enormous changes took place in their livelihood, owing to reduce income and reduced buying capacity for staple foods and other household items. The crabbers are trying to switch their occupations, like tri-cycle puller, daily labourer as they are not permitted to enter the Sundarbans. The authors have observed similar situation while investigating the life and livelihood of honey hunters. In this book chapter the authors (Lima et al., 2021, p 350) have claimed that the

honey hunters they have interviewed responded that “there was a clear restriction to enter the forest due to COVID-19. In this season, they stayed in the forest for only 30 days in two trips and could not go for other scheduled trips due to restriction. As a result, they collected only a small quantity of honey. At home, they also face challenges to sell the honey as the markets are closed. Thus, the honey hunters are facing problems for maintaining their livelihoods.” As a result, the honey hunters were also forced to switch their occupation like other forest dependent communities.

As mentioned earlier that this particular literature portrays the impact of COVID-19 and the lockdown situation on the different forest dependent communities. This is the only research that has been published that explicitly analyses the vulnerabilities of forest resource-dependent communities amidst the COVID-19 pandemic. Apart from this scholarly article, another notable contribution that has been explored while searching the literature is a blog written by Marie Joyce Godio published on the website called www.forestpeoples.org. In the article titled ‘Bangladesh case study: Sundarbans mangrove forest communities further marginalised by COVID-19 measures as super cyclone devastates livelihoods’, Godio quoted the spokesman of Unnayan Onneshan (A Bangladeshi Research Organisation) spokesman while explaining the impact of COVID-19 on the life and livelihood of the forest dependent communities. Godio quoted that “Approximately 95% of the traditional resource users (TRUs) in the Sundarbans have lost the massive share of income and 51% of them have no job. The ongoing crisis will increase the poverty rate among the forest people to 40%, and 43.5% of the households’ incomes are below the international poverty lines.” Apart from the standalone impact of COVID-19, Godio also focused on the impact of natural disasters during the COVID-19 on the life and livelihood of the forest-dependent communities. Drawing on this angle, several other authors have also published their thoughts.

Rashed Al Mahmud Titumir wrote his insights on pandemics and climate change issues in the blog published by IUCN. In his article, titled as ‘COVID-19 and Climate Change: Double Jeopardy for Traditional Resource Users in the Sundarbans’, Titumir mentioned that “the combined impact of climate change and COVID-19 pandemic is aggravating the marginalisation of the indigenous and local communities in the Sundarbans”. He mentioned that traditional resource users (TRUs) in the Sundarbans incurred substantial income loss when nationwide lockdown was imposed in response to COVID-19. Among all the authors, this desktop study has consulted, Titumir’s blog explicitly mentioned that respondents he has interviewed claimed that the traditional resource users (TRUs) in the Sundarbans did not even receive any relief or grant that could support their living and loan repayment capacity for the loans they have already borrowed from different moneylenders and NGOs. In his blog, Titumir explicitly advocated for fully-fledged lifecycle-based social security system is indispensable to enhance the adaptive capacity of the marginalised communities during the shocks such as COVID-19.

The explanation of Titumir’s ‘Double Jeopardy’ can be understood well while reading another blog written by Kayly Ober titled as “Complex road to recovery: COVID-19, cyclone Amphan, monsoon flooding collide in Bangladesh and India”. In her article Ober

mentioned the physical damage caused by the cyclone Amphan in and around the Sundarbans. She explained climatic disaster during a pandemic situation as complex and multifaceted disasters. She mentioned that this situation makes people more vulnerable than any other time. Sharanya Chattopadhyay explained this vulnerability in her journal article 'Covid-19 and the Way Forward: A Story of Livelihoods from Coastal Rural Sundarbans, West Bengal' as socio-economic-political and environmental stresses, problems and inequalities. She also mentioned that the impact of COVID-19 could be differential due to the inherent differential vulnerability of different communities. But her claims were not explained later in her article. But in this study, it could be a point of interest to test whether the forest-dependent communities faced differential vulnerability during the COVID-19 and lockdown period or not.

Summary of the desktop findings and way forward

The current literature identifies that, in terms of human capital the direct impact of COVID-19 and the lockdown situation was joblessness (Godio, 2020). As the forest dependent communities were not allowed for resource collection from the Sundarbans, irrespective of the job nature, forest dependent communities switched their profession as daily labour (Lima et al., 2021). This situation adversely affected their life and livelihood. None of the literature has discussed that whether there was any alternative income generating opportunities were offered to these communities during the COVID19 and lockdown period by different agencies that includes training and skill development opportunities. Therefore, this study will explore these issues while collecting information from the field.

The available literature suggests that COVID-19 and the lockdown situation have worsened the status of financial capital of forest dependent communities. Literatures have identified that as the forest dependent communities are changing their job and earning less due to COVID-19 and the lockdown situation, they are often taking loans from *mohajon*(the local moneylenders), relatives, local *samity* (cooperatives) and NGOs (Godio, 2020; Chattopadhyay, 2021 & Lima et al., 2021). These literatures do not essentially highlight that whether there was any group savings scheme among the forest dependent communities or any particular financial assistance they have received from any organisation to tackle the financial challenges they faced during the COVID19 and lockdown situation.

The issue of social capital was not much discussed in the available literature related to the impact of COVID-19 on lives and livelihood of forest resource-dependent communities in the Sundarbans. Only one particular popular article published in a blog, highlights that social life of the poor communities living around the Sundarbans were also disrupted due to the COVID-19 and lockdown situation (Godio, 2020). However, none of the literature identifies that how intra and inter household relationships were affected by the COVID-19 and lockdown situation. Whether the local social network that forest dependent communities rely on were disrupted or not. What type of social network played an important role in minimising the adverse effects of the COVID-19 and lockdown situation will be explored in this study as the current literature is not significant enough

in explaining the status of social capital of forest resourcedependent communities in the Sundarbans during the COVID-19 and lockdown situation.

In terms of the status of physical capital the literature by Rashed Al Mahmud Titumir explains the impact of COVID-19 and lockdown situation. He explained that during COVID-19 and lockdown period, different climatic disasters, he particularly mentioned about cyclone Amphan caused double jeopardy in terms of physical assets possessed by the forest-dependent communities in the Sundarbans (Titumir, 2021). In other popular blog of Refugees International, Kayly Ober (2021) mentions that loss of physical assets due to cyclone Amphan was devastating during the COVID-19 and lockdown situation. She and the local newspapers (The Business Standard, June 17, 2021) also hinted that the livelihood opportunities have been negatively affected by COVID-19 and lockdown situation, therefore communities living around the Sundarbans are facing real difficulties in restoring their physical assets damaged by cyclone Amphan and Yaas. In addition to that, few literatures have identified that households living in and around the Sundarbans are facing difficulties in marketing their collected resources and other productive goods they are producing, as the markets are remaining closed (Chattopadhyay, 2021 & Lima et al., 2021). However, the extent of the damage occurred has not been documented in any of the published literature yet. Therefore, this study will document the loss of physical assets of forest dependent communities during the COVID-19 and lockdown period.

The existing literatures explain that the life and livelihood of the communities living in and around the Sundarbans depends on the resources offered by the Sundarbans (Lima et al., 2021). Therefore, accessing the natural capital offered by the Sundarbans is the major livelihood opportunity for the forest-dependent communities. Available literature identifies that during the COVID-19 and lockdown period the access to this natural asset were restricted or limited for the forest-dependent communities (Godio, 2020; Golar, 2020 & Lima et al., 2021). This particular situation actually affected the status of other capitals as well. In addition to that, few literatures have identified that households living in and around the Sundarbans are selling different assets (land, livestock etc.) for coping with the difficulties they are facing under the COVID-19 and lockdown situation (Godio, 2020 & Lima et al., 2021). This situation is also worsening the access to natural capital for the forest-dependent communities. However, it has not been documented in the existing literatures that what alternative coping strategies were in place to restore the access to different natural capital or utilising the exiting access to different natural capital in addressing the adverse impacts of COVID-19 and lockdown situation. Therefore, this study will explore the coping strategies in maximising the outcome of existing use of natural capital by the forest dependent communities.

Table 4.1: Summary of the desktop findings and scope of this study

Capital	Main findings of the literature in relation to the impact of COVID19 and the lockdown situation	Knowledge gaps to be explored in this study
Human Capital	Joblessness and switching from forest-dependant income generating opportunities.	Scope of alternative income generating opportunities that includes training and skill development opportunities.
Social Capital	Disrupted social and cultural life.	Status of intra and inter household relationship; status of local social network; impact of local social network in addressing the challenges of the COVID-19 and lockdown situation.
Physical Capital	Double jeopardy caused by different climatic events during the COVID-19 and lockdown period.	The extent of the damage occurred in terms of physical assets.
Financial Capital	Higher dependency for borrowing loans from *mohajon*(the local moneylenders), relatives, local *samity* (cooperatives) and NGOs.	Status of group savings schemes and financial assistance from government and non-government organisations.
Natural Capital	Restricted access to the Sundarbans and landlessness.	Coping strategies in maximising the outcome of existing use of natural capital.

Table 4.2: List of published literature on the impact of COVID-19 on lives and livelihood of forest resource-dependent communities in the Sundarbans

Article Title	Author/Writer	Year of Publication	Type of Publication
Livelihood and health vulnerabilities of forest resourcedependent communities amidst the COVID-19 pandemic in southwestern regions of Bangladesh	Lima et al.	2021	Book Chapter
COVID-19 and climate change: double jeopardy for traditional resource users in the Sundarbans	Rashed Al Mahmud Titumir	2021	Blog
Catastrophic impact of COVID-19 on tourism sector in Bangladesh: an event study approach	Emon Kalyan Chowdhury	2020	Journal Paper

Bangladesh case study: Sundarbans mangrove forest	Marie Joyce Godio	2020	Blog
communities further marginalised by COVID-19 measures as super cyclone devastates livelihoods			
Complex road to recovery: COVID19, cyclone Amphan, monsoon flooding collides in Bangladesh and India	Kayly Ober	2020	Blog
COVID-19 and the way forward: a story of livelihoods from coastal rural Sundarbans, West Bengal	Sharanya Chattopadhyay	2021	Journal Paper
Poverty, climate change, ecology and COVID-19 in the Sundarbans	Wilson John Barbon	2021	Blog
Sundarbans shields south-western Bangladesh, again	Sadiqur Rahman, The Business Standard	2020	Newspaper Artcile
The effects of COVID-19 and cyclone Amphan in the Sundarbans	Anuja Mukherjee, BORGEN Magazine	2021	Blog
The social-economic impact of COVID-19 pandemic: implications for potential forest degradation	Golar et al.	2020	Journal Paper

5. FINDINGS OF OBJECTIVE 01: IMPACT OF COVID-19 PANDEMIC ON THE SUNDARBANS AND POPULATION LIVING AROUND THE SUNDARBANS RESERVED FOREST (SRF)

This section addresses the first objective of the study by exploring social, economic, political, and environmental consequences of the COVID-19 pandemic on the Sundarbans and population living around the Sundarbans Reserved Forest (SRF). Therefore, this section identifies how the pandemic situation affected the status of livelihood capital of Forest Dependent Communities living in and around the Sundarbans. In this section, we will first analyse the vulnerability context. The vulnerability context will be analysed in pre and post pandemic context. Later how the vulnerabilities are affecting the livelihood capital will be analysed. Then we will evaluate the activities of the Management of the Sundarbans Mangrove Forests in Bangladesh (SMP II) project and initiatives of Bangladesh Forest Department (BFD) in enhancing the livelihood strategies of Forest Dependent Communities. Finally, we would like to identify how the structural and procedural initiatives of the Sundarbans Mangrove Forests in Bangladesh (SMP II) project and initiatives of Bangladesh Forest Department (BFD) is strengthening the mitigation strategies of Forest Dependent Communities in a pandemic situation for livelihood enhancement and bio-diversity conservation in the Sundarbans.

5.1 The vulnerability context of Forest Dependent Communities

In this section the vulnerability context will be analysed in tri-partite view that includes trends, shocks, and seasonality. While analysing the trends the available literature revealed that prior the pandemic the forest dependent communities due to the lack of economic opportunities out-migration is a common phenomenon in the adjacent areas of the Sundarbans. While discussing this issue, we have also identified that outmigration is continuing and the covid-19 situation made this situation worsened. Therefore, considering the population trend, families are losing family members and significant number of cases has been identified where family members of Forest Dependent Communities moved to Dhaka and other cities for securing their livelihood. In terms of resource trends, prior studies highlighted that the amount of resource extraction is decreasing over time from the Sundarbans by the Forest Dependent Communities. While discussing this issue, our respondents have claimed that the amount of fish and honey they are collecting is decreasing over time and the lockdown situation imposed during the pandemic period affected their abilities to collect resources from the Sundarbans. While the national and international issues were not significantly highlighted under the vulnerability context in prior studies, but while discussing the issue with the respondents in this study, it has been observed that during the pandemic period cancellation of international flight caused huge vulnerability to the Forest Dependent Communities specially who are involved with crab business. The governance issues have been highlighted as a major trend in different literature, as the introduction of CMC is benefitting the marginalised Forest Dependent Communities for securing their livelihood

while also managing the natural resources of the Sundarbans. Our study identifies that in the pandemic situation the community-led governance structure failed to perform their activity and made the life of Forest Dependent Communities more vulnerable. This particular issue can be explained though narrating the remarks of key informant in the following box.

Box 5.1: Trends in governance in managing and conserving the Sundarbans during Covid-19
"*The pass permit was completely closed during the Corona period. During the closing of the pass, many people went secretly to catch fish without a pass by getting help from the Forest Department. They even sometimes catch fish with poison and such incidents have increased a lot during the corona period. The only reason for this is that people do not have income. Even many VCF members are involved in such activities. During the pandemic period, the government officials have formulated new CMC. This CMC is not currently affiliated with anyone due to some voting controversy and they are not able to do any work on their own. The new committee is not coordinating anything with VCF and PF."*

Source: Interview with Pradeep Chandra Mujumdar

In terms of technological trends, we have observed that Forest Dependent Communities have more access to electronic gadgets for getting information but for resource extraction they are using traditional methods. For monitoring the protected areas of the Sundarbans, lack of modern technologies is making the efforts of BFD and the communities fragile as the respondents claimed that people who are illegally extracting resource are using the leverage of lack of manpower of BFD and application of high-tech monitoring system will help the marginal Forest Dependent Communities to collect forest-based resources in a legal and systematic way. The major technological trend that we would like to highlight as a vulnerability context is use of poison for fish collection. This particular approach of fishing is becoming the major threat for marginal fishermen as they are not getting enough fish after the poisoning and the whole eco-system of the Sundarbans is under threat. A key informant from the BFD claimed that they do not have any sort of technology that could detect the fish which were collected by poisoning, and which were collected by usual legal fishing method. Therefore, in terms of trend, we would like to highlight that overall, the resource trend and trend in governance is creating the major vulnerability context for the Forest Dependent Communities. Considering the pandemic situation along with the aforementioned two trends, other three trends (population, national/international economic and technological trends) are also worsening the vulnerability context of the Forest Dependent Communities.

Table 5.1: The Vulnerability Context of Forest Dependent Communities under Different Trends

Trends	**Vulnerability Context**
Population trends	Out-migration due to economic reason
Resource trends	Lack of resource collection due to limited permission from BFD
National/international economic trends	Price of resources decreased due to lockdown situation

Trends in governance	Lack of participation due to top-down structured CMC
Technological trends	Lack of technologies for restricting illegal fishing

Regarding the shocks, it has been observed that Forest Dependent Communities are experiencing human health shocks, natural shocks and economic shocks. In addition to that the pandemic situation became a major shock which made the livelihood of the Forest Dependent Communities vulnerable. Existing literature shows that in terms human health shocks, the lack of drinking water and other health hazards are making the forest dependent communities vulnerable. Our findings also resemble with the existing literature. Although it has been observed that none of the family members of the interviewed respondents lost their life due to Covid-19 but people in the Sundarbans area are facing severe health shocks due to Covid-19. Lack of medical facility in the area and cost associated with medical treatment often makes the life of Forest Dependent Communities vulnerable. In addition to that lack of income is resulting to mal-nutrition which is also causing health shock. The situation can be portrayed through the following box.

Box 5.2: Human Health Shocks of Forest Dependent Communities

"*During Corona, we ate one meal per day. From the very beginning of the corona pandemic, I with my daughter, son, and wife had suffered from many problems.Everyone in the house had a fever during the Corona Pandemic. We had fever for three times in last two years. There are still two sick people at home. They are suffering from fever and chest pain. I am treating them with a local doctor. Due to my financial condition, I cannot get any better treatment from any outside good doctor. Every day, I am spending around fifty BDT to one hundred BDT for buying medicine for the treatment of them."*

Source: Interview with Ruben Biswas

In terms of natural shocks, it has been observed that natural calamities that include cyclone, river erosion and lack of drinking water are making the life of forest dependent communities vulnerable. During the interview with the respondents, it was identified that drinking water is the major challenge as the water is very saline here in the Sundarbans area. Most of the beneficiaries are using pond water and to get that water they must travel a lot. Water induced health hazard is quite common due to lack of drinking water provision. Another source of water provision is RO, but it costs a lot as per litre water costs 0.33 BDT. Most of the forest dependent communities claimed that they have faced loss of properties and lives during Sidr, Aila and the most recent cyclone Amphan. People who are living in the Rekhamari area are severely affected by river-erosion. The natural shocks are also causing health shocks. The overall situation can be explained through the voice of one respondent as follows:

Box 5.3: Natural Shocks Faced by the Forest Dependent Communities

"*During the cyclone Amphan, my house was totally damaged. The rooftop of our house flew away by this cyclone. When I repaired my house, I fell down from the roof. I was heavily injured that time. My belly was severely damaged, and a bamboo fence went inside my belly. I had to go for a massive surgery. The treatment was done in the local area and still I am facing several complications in the post-operative period. I lost my ability for working hard. The treatment cost me around 20000 BDT and I had to take loan from my relatives. I am now depending on the income of my 28 years son only, who is working as daily labor. My ability to go to the Sundarbans have been restricted due to the injury happened during Amphan."*

Source: Interview with Haripado Mandol

Economic shock is the major shock the forest dependent communities are facing. During the interviews with the respondents, it has been identified that lack of alternative income generating opportunities, dependency on the Sundarbans, number of income generating household members are the major cause of economic shock which is resulting into lack of income and making their life vulnerable. In addition to that particularly, the forest dependent communities are facing another economic shock that is locally known as 'Dadon'. As most of the forest dependent communities are fishermen, they are involved in local customary money lending system. The fishermen are taking loan from local money lenders for hiring fishing boat. Eventually they have to repay the loan by selling fish to these local money lenders. During the pandemic situation as they were not allowed to get pass from BFD and price of the fish reduced due to the lockdown situation, they are facing huge economic shocks to repay the loan. In addition to that the price hike of everyday goods is also causing economic shocks for the forest dependent communities. The situation has been explained as follows by one of the respondents:

Box 5.4: Economic Shocks Faced by the Forest Dependent Communities

"*After the Corona pandemic, our condition is much worse now than before because of low income. Before Corona, I used to sell crabs for 400 to 500 BDT per kg, now I sell them for 50 to 100 BDT per kg. At the time of Corona, everything was out of order, and everything was off. Crabs and fish did not fetch a good price at that time. We still don't get a good price for these. Tonight, I caught two kg of Hilsa fish. I sold these fish to the set houses or in the depot and these fish goes to Mongla from here. I sold these fish at BDT 320 per kg. Our fish buyers gave us Dadon (one type of loan given by money lenders with high interest). With this Dadon, we made the net and that's why they take commissions from our selling price of fish. The pandemic caused huge income loss in last two years and the price of everyday goods increased. Before we used to buy rice for 30 BDT per Kg now it is 52 BDT per Kg, cooking oil costs 150 BDT per liter which was 100 BDT before the pandemic. We are really facing difficulties with lower income and higher price of food items."*

Source: Interview with Sushant Paik

It has been identified that the pandemic situation has worsened different shocks that were prevailing in the Forest Dependent Communities the major shock is the loss of income due to the limited permission for extracting forest resources. Particularly the fishing communities faced huge income loss as the selling price of fish decreased during

the pandemic period. The shocks and the associated vulnerabilities have been listed in the following table.

Table 5.2: The Vulnerability Context of Forest Dependent Communities under Different Shocks

Shocks	Vulnerability Context
Human Health	Loss of working ability Chronic Illness Lack of medical facilities Higher cost of treatment
Natural	Loss of properties Health shocks due to natural calamities Damaged housing and physical infrastructures
Economic	Decreased price of collected resources
	Repayment of loan Increased price of food items Lack of grant/aid

While discussing about the vulnerability of forest dependent communities, seasonality is a major issue that we have considered. We have tried to explore seasonality of prices, seasonality of production and seasonality of employment opportunity. Resource extraction in the Sundarbans is always determined by seasonality. For fishing the peak period is between mid-October and mid-February. Other than that fisherman goes for fishing twice in every month. In every month there is two cycle of fishing depends on the position of the moon. Usually, the forest department provides permit twice in a month for seven days fishing in each cycle. The honey collectors go into the forests during April-May. The permission from BFD for forest resource extraction also depends on seasonality.

During July and August, due to the breeding season of different fishes BFD does not provide any BLC (Boat Licensing Certificate) which is the permission for fishermen for collecting fish from the Sundarbans. Similar restriction happens in October for Hilsha breeding Season and during January-February for protecting crab breeding season. Therefore, the price and production and employment of opportunity depend on the seasonality issues. During the pandemic period, a handful number of respondents mentioned that BFD did not issue BLC even after the restriction period which affected their livelihood. The seasonality issue is directly associated with institutional responses. If the fishermen do not get BLC on time, they had to incur big loss. In addition to that, when the restriction applied all of the fishermen becomes jobless for the restricted months. During the peak season the price of crab and fish remains low. In addition to that in the pandemic period due to the lockdown the price was the lowest in the lifetime of the interviewed fishermen. The whole vulnerability context due to seasonality can be explained through the following box and table.

Box 5.5: Seasonality Issues Faced by the Forest Dependent Communities
"*Now it's the running season of crabs, so we catch crabs. If we stay in the forest for a week, we can catch 15 to 35 kg of crabs. Two to four people can go to the forest by boat. We collect passes from the BFD. It costs about 210 BDT per person to buy a ticket for a week. For four people, it costs TK 840. When we go to the forest for a week, we have to take goods and other products of BDT 2000 for and BDT 1000 to 1500 in cash. When we go to catch crabs, the people of the forest department want a duty charge. So, we had to pay 100-200 BDT. The crabs we catch in a week sell for BDT 5,000 to 7,000. However, it depends on the Ghon. Sometime in the second Ghon we do not get enough crab and when the season is in its peak BFD does not issue any permission for fishing telling about the breeding season. During the early period of the season as most of the fishermen go for fishing the price of crab and fish goes down. The major problem is the restriction period, as we become jobless and there is no support that we have received during the pandemic period as an aid to survive in the restriction period."*

Source: Interview with Habibur Rahman Howdar

Table 5.3: Seasonality Issues that are making Forest Dependent Communities' Lives Vulnerable

Seasonality	**Vulnerability Context**
Seasonality of prices	Less price in the peak period
Seasonality of production	Dependency on the season and climatic condition
Seasonality of employment opportunity	Jobless situation during the restriction period

Understanding the aforementioned vulnerability context, it has been observed that the vulnerability context has been persistent, and the pandemic situation made the lives of forest dependent communities more vulnerable. This vulnerability context eventually affected the status of livelihood capital of the forest dependent communities which has been analysed in the following section. However, the lack of support from different agencies, the recurrent income loss due to price drop of fish and crab during the lockdown period and joblessness during the restriction period are the major effect of pandemic situation that affected the livelihood of forest dependent communities.

Table 5.4: Vulnerability Context of Forest Dependent Communities

Vulnerability Context	Trends	Shocks	Seasonality
Persistent Vulnerability	• Out-migration • Lack of resource • Lack of participation in Forest Management • Lack of technologies for restricting illegal fishing	• Chronic Illness • Lack of medical facilities • Natural Calamities • Loan from traditional money lender	• Permission from BFD • Jobless situation during restriction period
Vulnerability due to Covid-19	• Price of resources decreased due to lockdown situation • Increased illegal activities	• Illness due to Covid-19 • Loss of properties due to Amphan • Failure of loan repayment due to joblessness • Increased price of food items	• Price of resources decreased due to lockdown situation

6. FINDINGS OF OBJECTIVE 02: IMPACT OF COVID 19 ON THE LIVELIHOOD OF FOREST DEPENDENT COMMUNITIES

This section of the report identifies the asset profile of forest dependent communities to address the second objective of the study by assess the extent to which COVID-19 pandemic has affected and going to affect the lives and livelihood of the community entirely dependent on small-scale fisheries (inland and marine) and other riverine as well as forest resources for their subsistence.

6.1 Status of Human Capital

During the interview with the respondents and FGDs, it has been observed that the forest dependent communities are mostly posing the skills related to forest resources extraction. The professional is very much traditional and most of the forest dependent communities are relying on fishing and crab collection. While asking the respondents about any alternative income generating skill, they informed that they received training on crab cultivation and duck rearing during the EPASIIAEP project implemented by CODEC and supported by the BFD and UNDP. However, the lack of access to physical assets (access to land for crab cultivation) and the price drop of crab during the lockdown period under the pandemic situation incurred them huge loss in the last cultivating season. They have also informed that in absence of any skill-based training and another physical asset related issue (road communication) is hindering their opportunities to work in Mongla EPZ. While asking them about changing their occupation they mentioned that they want to rely on their present occupation but would like to focus on their future generation but educating them. However, during the lockdown period the education of their children was affected highly and due to economic hardship, they failed to support tuition facilities for their children.

As discussed earlier that the skills the forest dependent communities are generating employment opportunities which are mostly seasonal. Therefore, during the restriction period and especially during the lockdown period, the respondent of this study felt about the need of Alternative Income Generation Activities (AIGAs). Although, it has been identified that the respondents being the beneficiaries of other implemented projects in the locality (CREL, EPASIIAEP) were introduced with training and seed capitals for Alternative Income Generation Activities (AIGAs), but these activities were dependent on are land ownership, number of income-earning household members and support received from other aided projects. It has been observed that in the post project period lack of technical support from the experts and access to loan facilities disrupted their involvement in Alternative Income Generation Activities (AIGAs). But the major disruption happened due to the pandemic situation, as the lockdown was declared during the peak season of crab marketing (March to April) and the price drop of crab affected the livelihood of the fishermen community, who are involved in crab fattening.

Table 6.1: Human Capital based Livelihood Status of Forest Dependent Communities

Livelihood Resource Base	Modified By	Impact on Livelihood	Pathways to Sustainability
Human Capital	Lack of Skill Development Programme Involvement in AIGAs Pandemic Situation	Price drop of crab and debt trap Joblessness Dependency on Forest Resource Extraction	Diversified income generating opportunities Access to skillbased training Marketing channel development of AIGAs

6.2 Status of Financial Capital

Financial capital refers to the financial resources that people use to achieve their livelihood objectives (DFID, 1999). Access to cash or stocks is important because they can enable people to adopt different livelihood strategies. Financial capital is usually difficult to access, but it is the most desirable asset, and the lack of financial capital can be an indication of vulnerability and insecurity in terms of livelihoods (Davis, 2011). It has been identified that most of the forest dependent communities have loans from different micro-credit organisation. However, during the pandemic situation they took the loan for survival need rather than creating any income generating opportunities. This situation made their livelihood worsen than the pre-pandemic situation.

The major threat that is associated with financial capital of the forest dependent communities especially for fishermen communities is 'Dadon'. Most of the fishermen are involved in local customary money lending system. The fishermen used to have loan from local money lenders for hiring fishing boat. Eventually they had to repay the loan by selling fish to these local money lenders. While conducting the FGDs, it has been identified that almost all the beneficiaries are still paying the money to repay their loan from the local money lenders. As they had to stop fishing during the lockdown situation and later the price of fish drooped during the pandemic period, a significant earning from other income generating sources they are spending to repay the loans. This context can be described from the voice of one of the respondents as follows:

Box 6.1: Threats Associated with Financial Capital

"*Most of us have Dadon. As we cannot repay the Dadon, so we need to repay the Dadon by selling our productive assets or by taking loans from extended family members. We used to repay the Dadon by selling fish to the money lender. But due to the pandemic situation we could not catch fish and even after getting the permit from the BFD, we had to sell fish to the money lenders in a lower price. Now we are not sure when we will be able to repay that loan. As we are living in same communities, so we do not have any other choice but repaying that loan."*

Source: Interview with Md Kalam Howladar

In addition to the aforementioned problem, during the FGDs respondents mentioned that the gestation period of repayment of micro-credit is also a challenging issue for them. Participants of the FGDs also mentioned that the interest rate of micro-credit and the materialisation time of micro-credit often hinder them to take micro-credit for income

generating activities. For an instance, one beneficiary mentioned that buying an auto-van using micro-credit can ensure instant income generation but investing the loan for livestock takes time to repay the loan. As the road infrastructure and other physical capital is not supportive in the community (Box 07) to invest for such instant income generating activities, therefore they mostly used micro-credit for paying everyday household cost during the pandemic period. The absence of social security system put them on more pressure during the pandemic situation as they did not receive and cash or food grant during the pandemic period. While asking them about profit sharing from the BFD, all of the respondents mentioned that they do not know about such scheme. So, they are just relying on MFIs and Customary money lending system for accessing any kind of financial capital. Although different group savings programme was introduced in this community under different aided projects but during the pandemic situation most of the forest dependent communities failed to deposit savings in these groups.

Table 6.2: Financial Capital based Livelihood Status of Forest Dependent Communities

Livelihood Resource Base	Modified By	Impact on Livelihood	Pathways to Sustainability
Financial Capital	Lack of access to soft loans Lack of access to grant or subsidies Customary money lending system Pandemic Situation	Debt trap Selling of productive assets	Community based group savings programme Social Security System Profit sharing by the BFD

6.3 Status of Natural Capital

DFID (1999) defines natural capital as the natural stocks from which resources flow and services (e.g., nutrient cycling, erosion protection) useful for livelihoods are derived. Access and quality of the natural resources are critical to the strength of the natural resource base (DFID, 1999). During the fieldwork it has been identified that most of the Forest dependent communities are living on government *khas* land. Few of them have own cultivable land but the amount of land is not enough to secure their livelihood. Most of the beneficiaries staying on *khas* land do not have any legal paper but they are enjoying perceived tenure security. In few cases they are leasing the land and pond from the landowner.

It has been identified that life and livelihood of the forest dependent communities depends on the Sundarbans. While discussing with the participants during the FGDs, it was identified that fishing profession for six months is still a major livelihood strategy of a significant number of forest dependent communities. Apart from fishing, honey and collecting the crab are most common resources the forest dependent communities collect from the Sundarbans. Moreover, the life of the forest dependent communities depends on the Sundarbans. This claim can be explained with the following quote of one of the beneficiaries:

Box 6.2: Impact of the Sundarbans on the Livelihood of the Beneficiaries

"*Our life depends on the Sundarbans. Our women go for fishing on the river side for six months and our men earn money by fishing in the river for six months. The money we get from six months fishing, we use that money for living for another six months. The Sundarbans is a god gifted resource. It protects us from the natural calamities, it offers us our living and it is part of our life. I went to Dhaka for six months during the pandemic but the attachment I have with the Sundarbans forced me to come back here again. Moreover, I do not have any other skill, I belong here and the skills I have can be only applied in fishing in the Sundarbans."*

Source: Interview with Sunil Mazumdar

During the pandemic period, the access to the Sundarbans was restricted rather than the usual restriction (breeding season of prawn, *hilsha* and crab) which caused lack of income from extracting resources from the Sundarbans. Another major challenge associated with access to different type of natural resources are the role of law enforcement authority, illegal fishing and poaching of wild animal. During the FGDs, few of the respondents claimed that getting the legal pass for fishing in the designated area requires bribing. In addition to that, while marketing the resources they collect from the Sundarbans is also quite challenging due to the same problem mentioned above.

In the recent past, the increased number of catching fish through poisoning became a large threat for the marginal fishermen in the SRF. Few participants during the FGDs mentioned that the number of fish is decreasing due to poisoning. Respondents also claimed that weakening of VCF and PF during the pandemic situation made the comanagement system fragile which caused lack of monitoring of illegal activities and lack of access of fishermen in the SRF. However, during the KII with the personnel of the BFD, it has been identified that in the last year the BFD had earned around 40 million BDT as revenue which is the highest amount in last 10 years. Therefore, he claimed that the access of fishermen has not been restricted. However, he acknowledged that the pandemic situation caused some challenges in monitoring illegal activities. He also advocated for SMART patrolling, which is supported by the SMP project of GIZ, but mentioned that it could be scaled-up. The issue of scaling-up activities can be described through his voice as follows:

Box 6.3: Scaling-up SMART Patrolling System in the SRF

"*The current mechanism of community-based monitoring is functional, however, monitoring the activities in deep forest requires SMART patrolling system. Under the SMP project of GIZ, we have received drone and other equipment. However, the equipment and trainings we have received are not enough to operationalise SMART patrolling System in its full potential. The training was only for three days and most of the attendees were more than 45 years old. If we get support for extensive and regular training and equipment of SMART Patrolling System, it will be helpful for restricting illegal activities. The complaint regarding issuing BLC and harassment faced by the fishermen can be also addressed by automation. If we can have any capacity building programme that will eventually lead us to introduce GPS based fishing permit system, it will ensure accountability and better monitoring and management system in the SRF."*

Source: Interview with Md Asad Faraji

Moreover, the lack of coordination among different stakeholders which is resulting into lack of trust is hindering the natural resource management in the SRF. While discussing this issue during FGDs and KII it has been observed that the mentality of the Government Officials and the mentality of the Forest Dependent Communities regarding cooperation is a major challenge. It has been quoted by one of the key informants that the colonial legacy carried by the old generation of forest officials often put them in a situation where they are not willingly working with the forest dependent communities as there is an issue of class conflict. On the other hand, he mentioned that due to economic hardship being involved in illegal activities and having noiselessness, the forest dependent communities often fail to raise their rightful claim. However, this miss-trust among the stakeholders is causing illegal fishing in the SRF which is major threat in preserving the natural resources of the SRF. This situation can be explained through the following statement from one of the respondents:

Box 6.4: Role of Law Enforcement Agency and Illegal Fishing

"*The case from the law enforcement agency is a common phenomenon. When we are under any particular case, we extract more resource from the Sundarbans to repay the cost involved with the case. The local political leaders are also not helpful in resolving these cases. Before we used to seek help from the VCF, and PF members is resolving these conflicts but in the recent past we are not getting any help from them as the VCF, and PF member says that they are not connected with newly formed committee of CMC."*

Source: Interview with Rustom Mollik

The aforementioned findings can be summarised through the following table (Table 6.3). The Sundarbans is the major natural resource base for all the Forest Dependent Communities. Everyday life of the Forest Dependent Communities highly depends on the Sundarbans. As few of the respondents mentioned that resource collection from the Sundarbans, involvement in AIGAs and a participatory and accountable management system should go in parallel for graduating out of poverty, hence the resource extraction from the Sundarbans will eventually decreases over time. Therefore, the role of law enforcement authority and the issuance of legal documents for resource collection remain as a big challenge for securing the access to natural capital in a legal way. During the FGDs and KIIs, it has been identified that getting access to khas land for vegetable production and other agricultural activities and an accountable monitoring system of law enforcement agency could be instrumental for sustaining the natural resource base of the forest dependent communities.

Table 6.3: Natural Capital based Livelihood Status of Forest Dependent Communities

Livelihood Resource Base	Modified By	Resulting in Livelihood Strategies	Pathways to Sustainability
Natural Capital	Landlessness Illegality Lack of Effective Monitoring System	Illegal resource extractions from the Sundarbans	Access to khas land Automation of Comanagement of forest resource Trust building activities

6.4 Status of Physical Capital

The existing condition of the physical infrastructure that includes road infrastructure, housing condition and water supply facilities are hindering the livelihood opportunities of the Forest Dependent Communities. During the FGDs it was identified that source of drinking water and the existing road condition are the major challenges for them to secure their livelihood. In addition to that the gender dimension related to poor road infrastructure is restricting the beneficiaries to maximise the livelihood opportunity from the AIGAs. The following statement of one of the beneficiaries explains the scenario:

Box 6.5: Impact of Road Infrastructure on Livelihood Opportunities
"*The road infrastructure problem is quite challenging for marketing our product. It takes a lot of time and money to relate to Mongla. During the rainy season, it is tough to move in this area being women. I was thinking to buy an auto-van for my husband, but the road condition in this area is not favourable to support that venture especially in East Dhangmari."*

Source: Interview with Sopna Biswas

Table 6.4: Physical Capital based Livelihood Status of Forest Dependent Communities

Livelihood Resource Base	Modified By	Resulting in Livelihood Strategies	Pathways to Sustainability
Physical Capital	Road infrastructure Drinking Water	Compromising with marketing of product Higher cost of input materials	Effecting marketing channel

6.5 Status of Social Capital

While discussing about the attributes of social capital during the FGDs, it was revealed that neighbours and relatives were the major actors while supporting the beneficiaries during the pandemic situation. Living in the same neighbourhoods for quite long time created the trust and social cohesion among the beneficiaries. It has been observed that the support comes in different form that includes monetary help, land sharing (Box 6.6), knowledge sharing and mental support. The following statement from one of the beneficiaries reveals the form of social capital they are enjoying for sustaining their livelihood:

Box 6.6: Role of Social Capital for Securing Livelihood Opportunities
"*During the pandemic situation, I faced real hardship as I was not allowed to go the Sundarbans.At the time of the Covid-19 pandemic; I didn't get any help from the government or union Parishad (UP). My neighbour helped me to offer share cropping in his land which helped to cultivate the rice for supporting my family. My brothers also helped me financially during the treatment of my wife."*

Source: Interview with Sudansu Mojumdar

Apart from the one-to one social relation, the role of CMC was quite vital in institutionalising the form of social capital. Platforms like VCF and PF tried to protect the fishermen form different legal challenges associated with resource extractions from the Sundarbans. However, it has been observed during the FGDs that there is a weak relationship between the Forest Dependent Communities and the local government institutions. This weakening relationship has a direct impact during the pandemic situation as most of the respondents claimed that they haven't received any support during the pandemic period.

Table 6.5: Social Capital based Livelihood Status of Forest Dependent Communities

Livelihood Resource Base	Modified By	Resulting in Livelihood Strategies	Pathways to Sustainability
Social Capital	CMC Social Cohesion	Financial and mental support	Social safety net Women led community-based organisation

From the above analysis, it has been observed that life and livelihood in terms of asset profile of the forest dependent communities has been severely affected by Covid-19 pandemic. It has been observed that fishermen community were highly affected due to the lockdown situation which restricted their ability to get access into the natural capital.

7. FINDINGS OF OBJECTIVE 03: MITIGATION MEASURES OF GIZ IN ADDRESSING THE VULNERABILITY OF FOREST DEPENDENT COMMUNITIES AND BIODIVERSITY CONSERVATION IN THE SUNDARBANS

This section explains the effectiveness of COVID-19 mitigation measures adopted by the GIZ in increasing functionality of the BFD, preventing of poaching and other practices relating to illegal forest resources extraction, smoothing of food security of extreme poor households, improving mental health of the children, and supporting children education during pandemic situation.

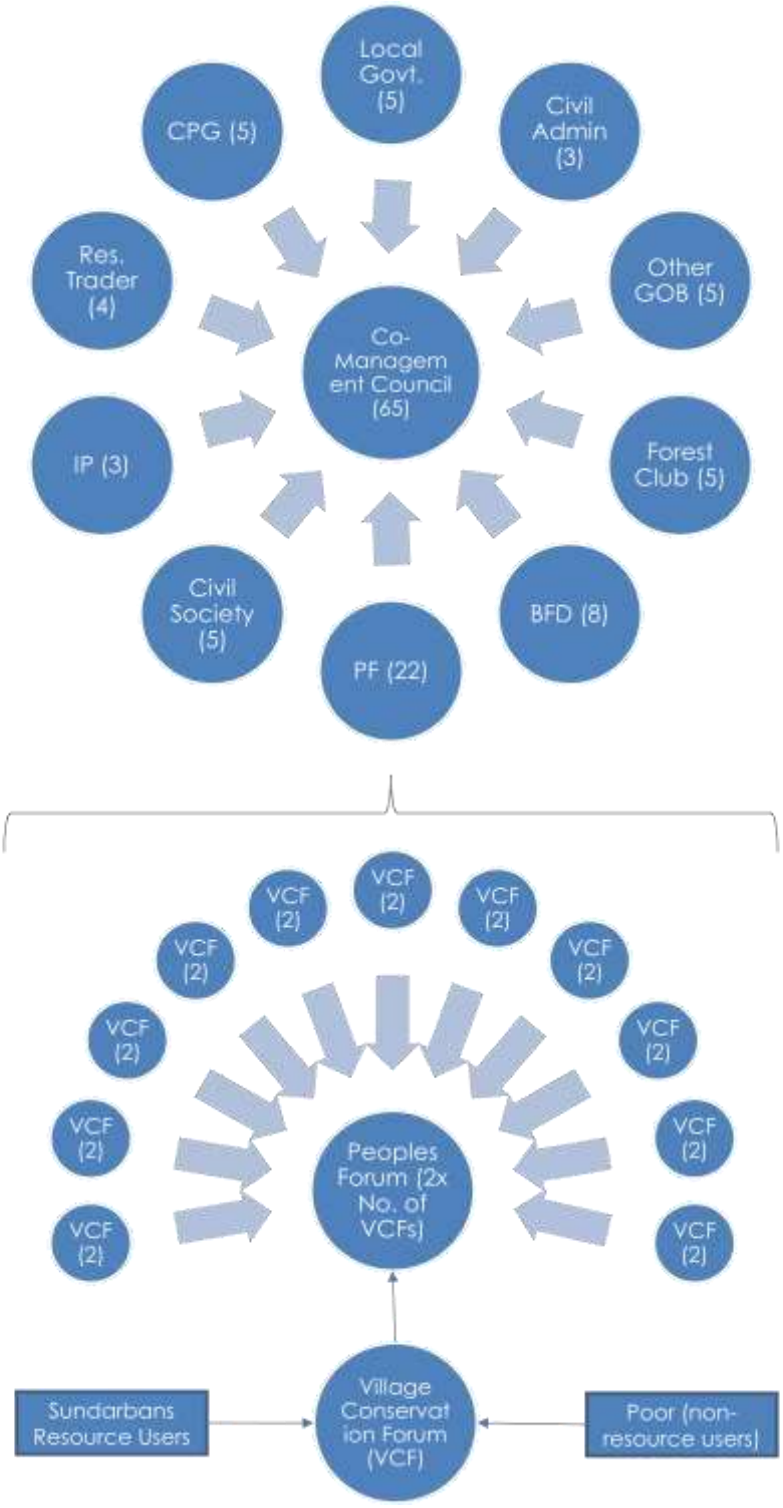
7.1 The Structural Issues: Regenerating Co-management

The above findings reveal that the life and livelihood of the Forest Dependent Communities depends on the natural resources of the Sundarbans. Therefore, this study explored the effectiveness of mitigation measures adopted by GIZ in addressing the vulnerabilities associated with Covid-19 and in increasing the functionality of Bangladesh Forest Department and Forest Dependent Communities in ensuring better management process in the Sundarbans. The mitigation measures of GIZ had two foci: first one was increasing the capacity of the community and Bangladesh Forest Department for promoting better coordination in managing the Sundarbans and the second was supporting the community to address their vulnerabilities. In terms of institutional perspective, it has been explored during the grey material analysis, KIIs and FGDs that for managing the Sundarbans Reserve Forest several international organisations started working with Bangladesh Forest Department. Among several activities, introducing the concept of co-management was a significant attribute of these programmes. To incorporate the role of Forest Dependent Communities in managing the Sundarbans Reserve Forest three consecutive USAID-funded interventions: the Nishorgo Project, Integrated Protected Area Co-Management (IPAC) project, and Climate Resilient Ecosystems and Livelihoods (CREL) project are the most notable projects.

In 2006 Nishorgo project started the pilot project in developing a community-based structure for managing the biodiversity of the Sundarbans. Later in 2009 under the IPAC project first Village Conservation forum (VCF) were established and later was institutionalised through a structure jointly developed by Bangladesh Forest Department and CREL project. This structure is now labelled as the co-management structure of the SMF which was gazetted in 2017 and was endorsed by Protected Area Act 2017. The current co-management structure has three tiers. In the first tier Village Conservation Forum (VCFs) was established at community level, which is the most grass-rooted tier of the co-management system. SMF resource users as well as the poorest section of the communities adjacent to the SMF can become members of the respective VCF. It is managed by an executive body. The People's Forum (PF) is the next tier established at Forest Range level constituting the umbrella structure of resource users and poorest people. Each VCF in the respective range is represented in the PF by two elected representatives (one male and one female). It likewise has an executive body. The

overarching structures for co-management are the Co-Management Councils (CM Council) at Forest Range level. Their executive bodies are called Co-Management Committees (CMCs). Both have representatives from the PF, the BFD, other government agencies, the local government, civil society, and other relevant stakeholders. The CM Council is the highest body for co-management of the respective Forest Range. Following figure shows the organisational structure of co-management of the SRF.

Figure 7.1: Organisational Structure of Co-management of the SRF



Source: GIZ, 2017

Although, this co-management concept was institutionalised, but during the KIIs it has been explored that after the phasing out of CREL project in 2017, the activities of the co-management structure became less participatory. Particularly the active engagement of VCFs and PFs in decision making process became week and often manipulative. It has been observed that resource users are not yet fully represented in the VCFs and PFs nor can they adequately voice their concerns about issues particularly relevant to them. Moreover, VCFs and PFs have limited organizational capacity and processes, such as coordination and communication, are not yet fully functioning. Limited understanding about co-management and the expected roles of different co-management tiers are other prevalent issue among the community level tiers as well as among staffs of the BFD. In addition to that as the women rarely enter the forest for direct resource harvesting due to cultural norms and practical constraints, women participation in the co-management structure was overlooked. In addressing these aforementioned challenges Management of the Sundarbans Mangrove Forests for Biodiversity Conservation and Increased Adaptation to Climate Change Project (SMP) of GIZ started supporting the BFD to better fulfil its role within the co-management structures and at the same time to strengthen the participation of resource users in decision making about the SMF. SMP's support to further development of the co-management approach focused on Chandpai Range of the SMF with 37 VCFs, 1 PF and 1 CMC. SMP collaborated with the local NGO Center for Natural Resource Studies (CNRS) to implement selected activities on the ground. Although the SMP project is trying to regenerate the co-management process of the SRF, but the current project is covering the Chandpai range of the SRF while the activities of SMP has not been introduced in the Soronkhola range yet.

7.2 The Structural Issues: Women Empowerment

For involving women in the co-management process SMP formulated women groups under the umbrella of existing co-management structures and implemented capacity development activities to increase women's participation in decision making about the SMF. These activities were beneficial in encouraging the participation of resource users in the management process of the SRF through VCF, PF and Women group. While conducting the FGDs, it has been observed that the participation of Forest Dependent Communities is now self-actualised, and they are more aware of their right and protecting the biodiversity of the SRF. Following statement portrays this finding:

Box 7.1: Role of SMP in Regenerating the Activities of VCF and PF

"*CREL project ended about three years ago but our organisation such as VCF, CMC, PF, patrolling group are still active under the SMP project. The members of patrolling are working willingly, and they don't get any support from the government or forest department. After the ending of CREL project, it was difficult for us to run these organisations. CMC had some own fund. By this fund, we bought some van, easy bike etc. for the members of VCF. By the profit of these investments tried operating these organisations. However, just after a year of project ending, we faced it really difficult to sustain our regular meeting and awareness building activities. During the CREL*

project, we used to conduct a monthly meeting but now we are conducting a meeting about three month's interval period. At present, the SMP

project is trying to regenerate these organisations. They are also involving women and children in the capacity and awareness building process. During the pandemic situation, SMP project provided food support for the VCF members with about 20 KG rice, 1000 BDT cash support, oil, mask, soap etc. SMP project was launched a year ago, but they can't run their activities at a full speed because of Covid-19. They are trying to work in the health sector, education sector and livelihood sectors. In our area, people are more conscious about the illegal activities. It is rare that, people go to forest illegally. People know the rules and regulation. They are unwilling to break the rules. Due to the women group of SMP, female members of the household know the rules and regulation more clearly. They became the major patron for the male members to obey the rules."

7.3 The Structural Issues: Inter-generational Awareness Building through Engaging Children

The notable achievement that we would like to highlight in describing the major contribution of SMP project of GIZ is acknowledging the inter-generational awareness building in ensuring bio-diversity conservation in the Sundarbans. SMP special initiative organised social art work, organised story writing and drawing competition, conduct mangrove biodiversity observation events, street drama show on deer poaching & fish poisoning, biodiversity sculpture making, celebrate World Mangrove Day 2021 and publish 2 booklets, 1 Ludu, 1 IEC on corona, 2 posters on deer poaching and fish poisoning along with study circle. During the KII, it has been explored that Forest Dependent Communities who are involved in illegal forest resources extraction activities were not aware of the bio-diversity conservation issues and grew with a mentality from their childhood that resources are to be extracted in any means. However, building awareness among the children through study circle programme by introducing a book reading event on the book '*Chorai Chobite Sundarbans'* is an input which might have inter-generational impact in conserving the biodiversity of the Sundarbans. SMP project has developed 20 study circles and each study circle 30 students are participating. While interviewing the students who are participating in the study circle programme implemented by BEDS and supported by MP project of GIZ, it has been observed that the new generation who are yet to be involved in extracting resources from the Sundarbans are not interested to join their ancestor's profession and are aware of conserving the biodiversity of the Sundarbans. This dichotomy between two generations is very explicit as the new generation wants to move out from the Sundarbans area and would like to be involved in alternative income generating activities the resource user groups want to stay here in the Sundarbans and would like to live with the resources they are collecting from the Sundarbans. The following box shows this aforementioned dichotomy of two generations:

Box 7.2: Dichotomy between Generations Regarding Dependency on Forest Resources

"My father used to catch seasonal crabs in the Sundarbans and sometimes also catch fish during the off-season of crabs in the jungle. My mother is a housewife. But she is also an active member of the VCF association. I have two elder sisters. They are married. I am the youngest child of my parents. As my parents are illiterate and my sisters also didn't get the opportunity for education, they want me to grow up as an educated person. They are trying their best to educate me. I want to be a NGO worker and would like to move to the cities." – a 12 Year Old Student

"The jungle is like a mother to us. We can't live a day without the jungle. I am depending on Sundarbans for about 40 years. I have to stay here because at least there is a place of living but if we go somewhere else where we will stay, what will we do. Besides, I can't do any work that I can do in the town as well as the work in the town area is very hard to do. So, I think I will not leave my ancestral property no matter how hard it is." – a 55 Year Old Respondent

The study circle programme has multiplier effect as well. Right now, 600 children are participating in study circle programme, and they are aware about the management issues of the Sundarbans. While interviewing few of them, they have claimed that from their knowledge they are trying to motivate their family members in preventing illegal resource extractions from the Sundarbans. They have also claimed that from them other school going children in their neighbourhood who are not involved in the study circle programme are also learning about the management issues of the Sundarbans which is creating a multiplier effect. In addition to the study circle group, under the SMP different drama groups have been formed with the school going children and students were trained to develop the manuscripts, performing in the stage and staging the drama in the public places for creating awareness among the forest dependent communities in conserving the forest resources. Participants of this drama group members claimed that they could be the change makers by disseminating different information regarding the conservation of the SRF through the drama they are designing and performing. The members of the study circle group also participated in art competitions as part of the awareness building activities as well. Although the whole activity of disrupted due to COVID-19 but still it created a lasting impact on the cognitive skill of the school going children regarding the management of the SRF. The impact can be portrayed through the voice of a student participating in the study circle programme under SMP:

Box 7.3: Role of SMP on the Cognitive Skill of School Going Children

"During the pandemic situation, our study was badly hampered, and we haven't received any support from anywhere. We only got educational help from GIZ during the corona situation. About 8 months ago, we got a book on the Sundarbans, notebooks, pen/colour pencils, calendar, bag, Ludo-based on Sundarbans, mask, sanitizer, biscuits, and fritters from GIZ. The book is very interesting and informative. We are very satisfied to read it because we learned many things about our Sundarbans. We came to know about various trees and animals of Sundarbans, rivers, how to protect them, what to do and what not to do for protecting Sundarbans by reading the book. The Ludo game is also very interesting. It is designed through maps of the Sundarbans with various pictures of Sundarbans instead of snakes. We had fun as well as we learned many things by playing it. In the Ludo, red colours represent the fault or danger of Sundarbans like using poisons, hunting tigers/deer & others, cutting trees, etc. and green symbols represent the good activities and opportunities for Sundarbans. We also performed various activities such as street drama, art competitions, different day celebrations, etc. These are arranged by our school under various organisations like BEDS. We all played different roles/characters in the street drama. Most of the dramas are based on the Sundarbans. Three of our study circles playing one or the other role in the drama. The drama is very interesting, and we are having fun and teaching our village people about the Sundarbans and how to protect it."

Source: FGD with School Going Children

Although the participating students expressed their satisfaction regarding their engagement in the SMP programme, but they have also asked for scaling-up this type of activities. From their voice, we have understood scaling-up as a process to institutionalise their learning equipment (specially the book) as a compulsory reading book in the secondary schools in geographical area adjacent to the Sundarbans. Right now, BEDS is distributing this book to the study circle members only and personnel from BEDS are introducing this book to the study circle member as an extra-curricular activity. Institutionalising this activity with the help of school administrations, local public administration, local education office and ministry of education will be really beneficial to foster inter-generational knowledge transfer and awareness building activities. Therefore, it will help to develop a generation who will be very sensitive to conserve biodiversity of the Sundarbans.

Regarding the challenges associated with this programme, it has been explored that student who are facing economic hardship have a tendency to be involved in illegal forest resource extraction activities with the adult family members, although they are not interested to be part of these activities. While asking them about the cause of such involvement, they replied that they have to contribute to the household income but as there is no other option, so they are involved with these types of activities. This situation became worsen during the pandemic situation. Another significant challenge that has been explored is the rate of child marriage during the pandemic period. It has been observed that a good number of study circle member were dropped from the programme because of child marriage. The situation has been explained by one of our respondents as follows:

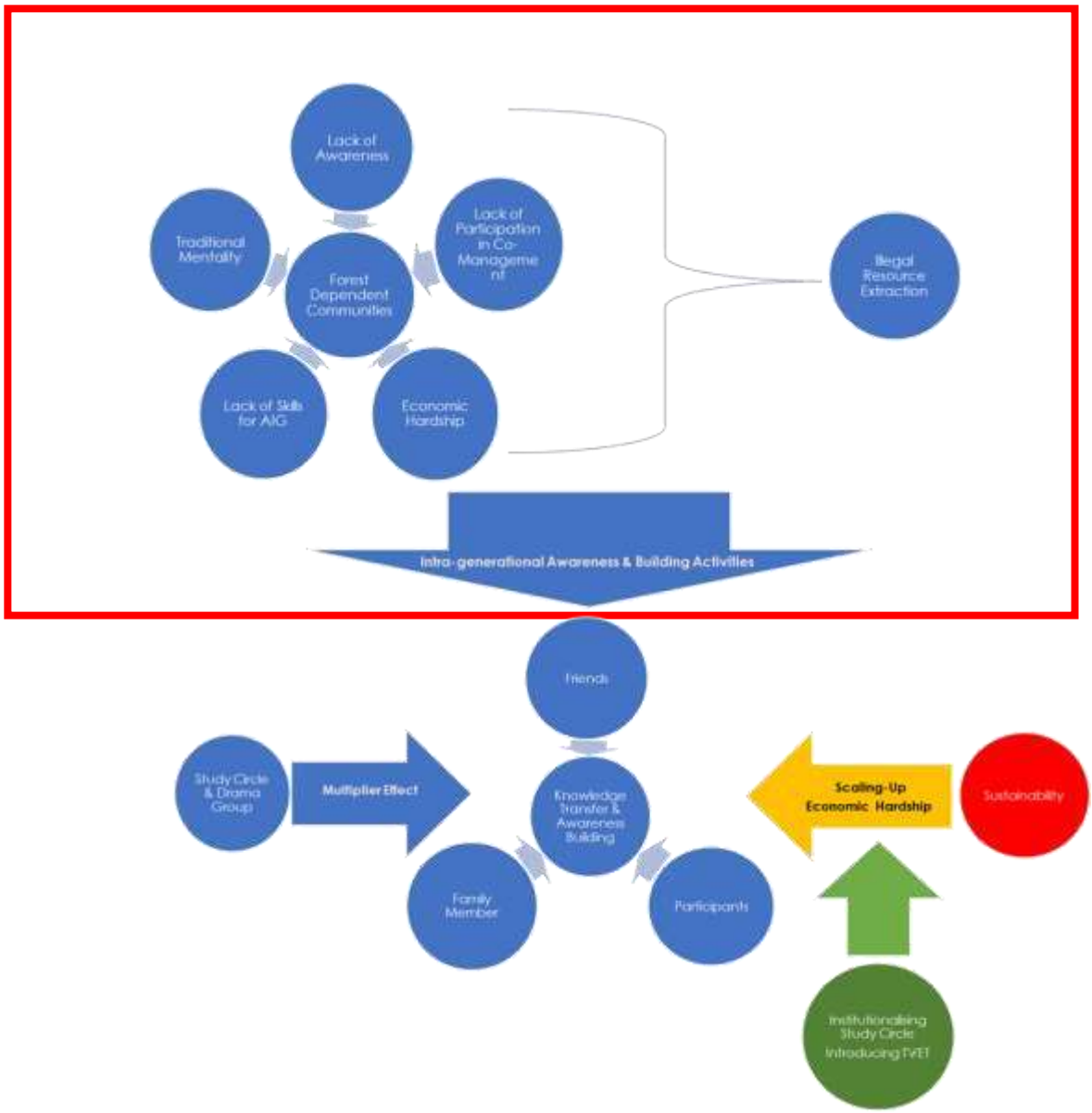
Box 7.4: Problem of Child Marriage during the Pandemic Period

"The rate of early marriage was very high during the corona situation. In our village, this rate is far too high. Many of my friends and school seniors were married at an early age, ranging from fifth to tenth class. In this particular condition, these earlyaged girls in our community are getting married. Their parents stated that because their daughter's studies had been interrupted, they didn't find any reasons that they could keep her free in their house. By paying a member or chairman, they can get a false birth certificate. Or they do it by hiding, with cousins, pretending to be cousins, travelling to another location, possibly to relatives, etc. The occurrence of early child marriage has a variety of reasons. The primary cause is parents' unconsciousness. They consider their girls to be a burden on their heads. In our area, the majority of the families are in poor financial conditions. They do not want to pay for their daughter's education."

Source: FGD with School Going Children

Although there are few challenges, but it has been observed that the study circle programme is having significant impact considering inter-generational benefit in creating awareness regarding the bio-diversity conservation of the Sundarbans. One particular challenge for the families who are facing economic hardship can be addressed through introducing TVET for adolescent that will create the opportunity for alternative income generating activities. However, we would like to recommend for scaling-up this activity considering the following inter-generational outcome of the project.

Figure 7.2: Inter-generational Outcome of the Study Circle Programme of SMP



7.4 The Support Services of the SMP during the Pandemic

Apart from the structural measures, during the pandemic situation different incentives were provided for the BFD and forest dependent communities through the SMP. As it has been discussed earlier that all of the respondents claimed that they haven't received any financial or aid support during the pandemic period but the beneficiaries of the SMP received 20 kg of rice, 2 kg pulses, 2 kg oil, 2 kg salt, hand sanitizer, facemask and 1000 BDT cash from the partner NGO- CNRS during the pandemic period. The hand wash stations installed by SMP in different locations helped the personnel of BFD and the local community in preventing the spread of COVID-19 virus and created awareness among the community regarding sanitisation. One key informant claimed that the personal protective equipment for BFD personnel provided by SMP helped the BFD to carry on their everyday activities during the first wave of the pandemic.

8. FINDINGS OF OBJECTIVE 04 AND 05: RECOMMENDATION AND CONCLUSION

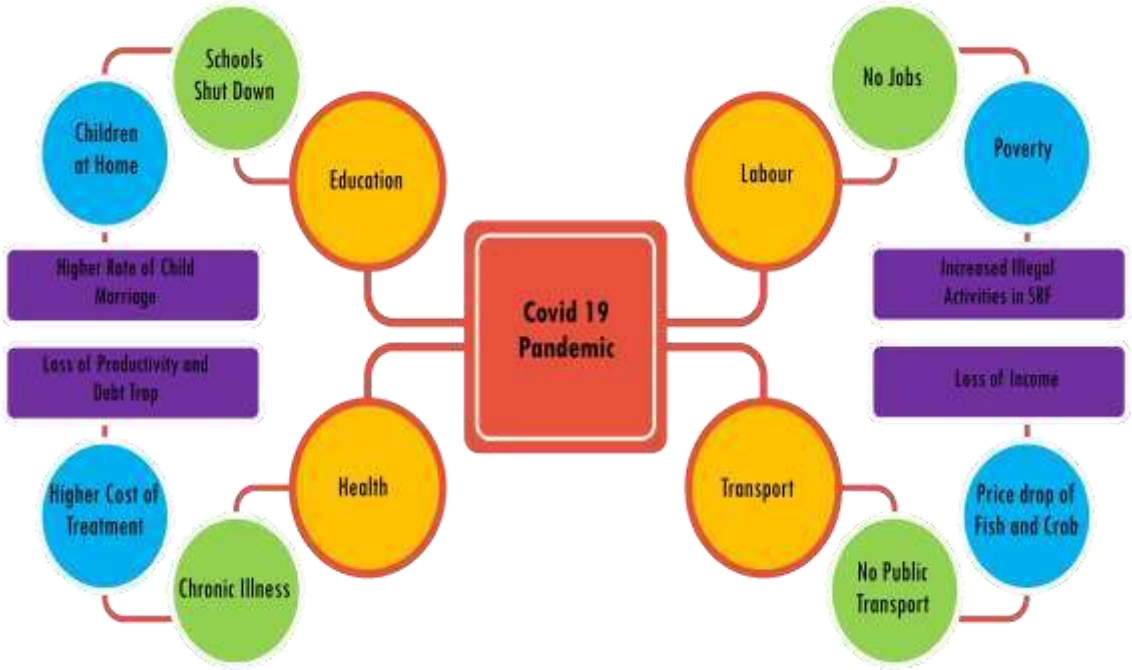
8.1 Summary of Findings and Way Forward

In this section we would like to summarise our observation and highlight the way forward to for enhancing the contribution of SMP project of GIZ in mitigating the vulnerabilities of Forest Dependent Communities and managing the SRF in a sustainable way. In this section of the study, we would like to highlight the impact of COVID-19 in the community of the project area and the effects on conservation of the SRF. In addition, we would like to showcase the adopted mitigation measures under SMP programme in enhancing the functionality of Bangladesh Forest Department to prevent poaching, smoothing the situation of the extreme poor and lifting the spirit and awareness level of the youth. Therefore, this section will summarise the whole study under five issues: (i) Vulnerability due to Covid-19; (ii) Livelihood Status of Forest Dependent Community; (iii) Mitigation measures under SMP Programme of GIZ; (iv) Gaps in the Mitigation Measures; and (v) Room for Manoeuvre. Under every single issue we would like to highlight the present context and what could be done in implementing future development activities (Table 8.1).

8.1.1 Vulnerabilities due to Covid-19

To summarise the impact of Covid-19 in the community of the project area, the following cascade analysis has been performed using the findings of vulnerability context mentioned in section 5.1 of this study. The cascade analysis (figure 6.1) shows that the major impact of covid-19 can be depicted under four major areas that include health, education, labour, and transport. Under the health issues, it has been observed that lack of medical facilities is a persistent challenge in the project area. This particular situation faced exacerbation during the Covid-19 period as people were suffering with chronic illness and due to lack of medical facilities and higher cost of treatment, communities in the project area lost their productivity and were debt trapped to recover the costs associated with medical treatment. In terms of labour, it has been observed that during the pandemic period joblessness was the major challenge for the forest dependent communities, which in few cases resulted through engagement in illegal resource extractions. The restricted entry permission in the SRF during the pandemic period was claimed as a major cause of joblessness by the respondents of this study. The significant factor that affected the livelihood of the forest dependent communities was associated with transportation issues, as during the lockdown period the communities in the project area struggled a lot to market their product which eventually resulted into price drop of crab and fish. Therefore, joblessness was coupled with loss of income due to the lack of marketing facilities of the resources the forest dependent communities are extracting and producing in the project area. The cascade analysis also portrays that as most of the schools were closed during the pandemic period, it resulted through the increased number of child marriage in the project area.

Figure 8.1: Cascade Analysis of Impact of Covid-19 on the Livelihood of the Forest Dependent Communities



Understanding the aforementioned context, the following section identifies the major impacts of Covid-19 on the Livelihood of the Forest Dependent Communities and portrays possible solutions in addressing the impacts.

Joblessness: It has been observed from the study that due to pandemic situation the Forest Dependent Communities were jobless, and they are often facing seasonal unemployment.

What to do and how to do: We would like to recommend for introducing alternative income generating activities. To do so different skilled based training can be provided to the beneficiary households of SMP project. Before providing the training an assessment of required skill and motivation to be involved in particular AIGAs has to be identified. While conducting the training involving different government agencies and NGOs could be beneficial, as they will be local knowledge hub during the post-project period. Providing soft loans, grants as seed funding could be really beneficial in promotion of AIGAs for the Forest Dependent Communities.

Price drop of fish and crab: It has been observed that the fishermen communities are solely dependent on local depot and money lenders while selling the fish. In particular during the pandemic situation fishermen were less paid as the national and international supply chains were dismantled.

What to do and how to do: A market study has to be conducted to identify the possible way outs regarding this issue. The possible area of exploration could be introducing storage facilities, linking the marginal farmer with different co-operative based marketing system.

Illness: It has been observed that chronic illness of family members is quite common among the forest dependent communities. The pandemic situation made this situation worsen.

What to do and how to do: As the SRF area is very remote and often the Forest Dependent Communities are struggling to get proper medical facilities, we would like to recommend for launching mobile clinics by the BFD and international development partners. The cost could be recovered through inception of health insurance facilities within the Forest Dependent Communities.

Increased Illegal Resource Extraction: It has been observed that the number of incidents of using poison for fishing has been increased during the last two years.

What to do and how to do: Automation of permission of fishing and resource extraction from the Sundarbans could be the key instrument for protecting illegal resource extractions. In addition to that research and development projects could be launched for performing rapid test to detect the fishes that are collected through poisoning. Enhancing the capacity of the BFD will be a key issue in performing this proposed rapid test. Integrating Department of Fisheries of GoB could be beneficial in this process.

8.1.2 Livelihood Status of Forest Dependent Community

Apart from the major vulnerabilities caused by the pandemic situation, there are few persistent challenges that are associated with the access to different capitals. From the interviews with the respondents, the following section highlights lack of access to financial and social capital as the major challenges for securing livelihood opportunities by the forest dependent communities.

Lack of access to finance and grants: It has been observed that higher dependency for borrowing loans from *dadondar* (the local moneylenders), relatives, local *samity* (cooperatives) and NGOs exist among the Forest Dependent Communities. The pandemic situation created a debt trap for most of the interviewed respondents. **What to do and how to do:** Automation of safety-net programme could be really instrumental for ensuring access to different grants provided by GoB. In addition to that regenerating the savings groups created under different development projects and consolidating those groups under an umbrella organisation could be beneficial.

Lack of linking capital: The Forest Dependent Communities have mentioned that their voices are not heard however they are member of VCF and PF. They have also mentioned that a strong social tie and kinship exist between the forest dependent communities, but they are not linked with local political and administrative structure.

What to do and how to do: We would like to recommend for integrating local political and administrative structure in any development projects implemented by international development agencies. To link the community with local political and administrative structure a monthly courtyard session with each VCF could be really instrumental.

8.1.3 Mitigation measures under SMP Programme of GIZ

Regenerating community groups for better co-management of the SRF: It has been observed that under the SMP project GIZ is trying to enhance the capacity of VCF and PF. However, we have observed the conflict in formulating the present adhoc CMC.
What to do and how to do: We would like to recommend for a dialogue between the BFD, GIZ and Local Administration to follow the gazette structure for formulating the CMC. Elected representatives from the resource user groups should lead the comanagement process. Therefore, the similar democratization process can be followed for each tier of co-management system.

Emphasis on women participation in co-management of the SRF: It has been observed that under the SMP project women groups have been created but has not been institutionalised in the present structure of CMC.
What to do and how to do: The capacity building programme for women group needs continuation. In addition to that a government level negotiation by the development partners can help in restructuring the gazette notified structure of co-management of the SRF to include women group representatives in the current structure.

Engagement of school going children in awareness building activities regarding bio-diversity conservation of the SRF: This is the most remarkable contribution of the project as it is creating a platform for inter-generational awareness building and capacity enhancement opportunities. However, the participants have mentioned that this type of programme can be scaled-up.
What to do and how to do: We would like to recommend for institutionalising the learning equipment (specially the book) of the study circle programme as a compulsory reading book in the secondary schools in the geographical area adjacent to the Sundarbans. Right now, BEDS is distributing this book to the study circle members only and personnel from BEDS are introducing this book to the study circle member as an extra-curricular activity. Institutionalising this activity with the help of school administrations, local public administration, local education office and ministry of education will be really beneficial to foster inter-generational knowledge transfer and awareness building activities.

8.1.4 Gaps in the Mitigation Measures

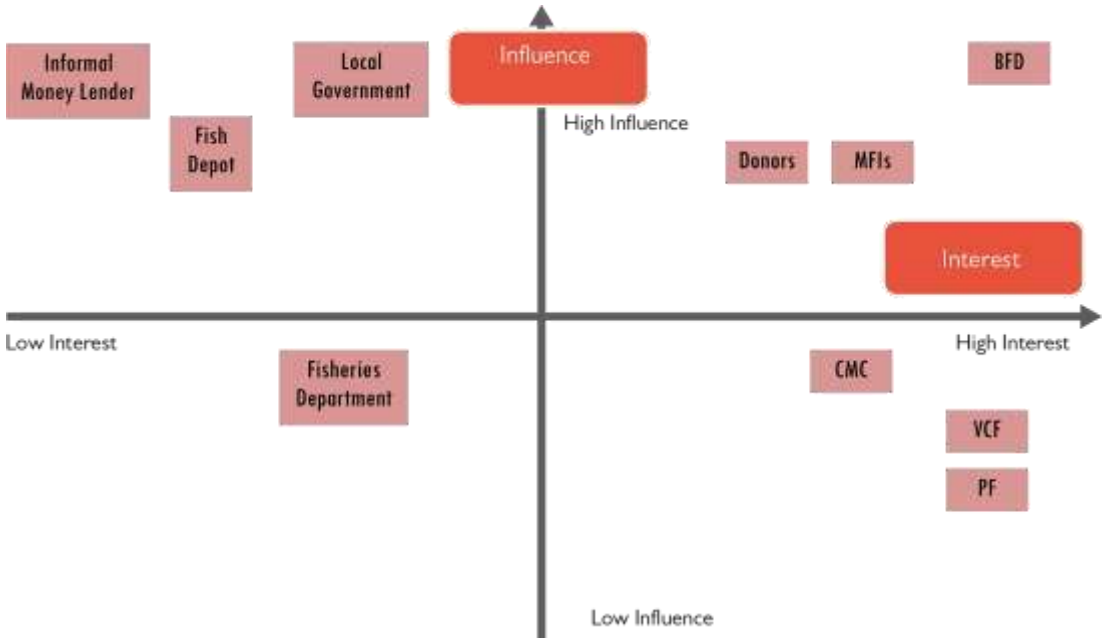
Lack of Scaling-up of SMART Patrolling System: Under the SMP project of GIZ, the BFD has received drone and other equipment. However, the equipment and trainings offered are not enough to operationalise SMART Patrolling System in its full potential. During lockdown period, mentoring services from World Conservation Society (WCS) were closed which hampered SMART patrolling in the field during this period.
What to do and how to do: The capacity building programme for SMART Patrolling System is essential that includes logistic and training support. Integrating the GPS based fishing permit will be really instrumental in implementing the SMART patrolling system.

The BFD can implement this automation process through the support of GoB and other international development partners.

Involvement of children in illegal resource extraction from the SRF: It has been observed that, children who are participating in study circle programme with economic hardship are forced to join illegal resource extraction with the family members.
What to do and how to do: We would like to recommend for pilot project in introducing TVET for the adolescents and savings group for supporting future education.

Lack of Political and Administrative Support: While discussing the issues of different actors' involvement in co-management process, it has been identified through a stakeholder analysis (Figure 6.2) that Bangladesh Forest Department has high interest and high influence in operationalising co-management process. Although the forest dependent communities feel that the local government institutions are influential actors, but they have low interest in different activities of the co-management process. While discussing this issue with local government representatives, it has been identified that lack of awareness building activities regarding the functions of local government representatives under the PA Rules has not been institutionalised by any GO or NGO initiatives. The geographical jurisdiction of each local government representative has not been documented by the BFD as well. The administrative structure of BFD is under different ranges of the SRF;however, this does not match with the geographical distributions of local government representatives. Therefore, jurisdictional spillover is a big challenge that needs to be addressed in engaging local government institutions in making the co-management structure effective and efficient. During the interviews, few respondents have claimed that more engagement of local elected political leaders in awareness building activities and monitoring the illegal activities in the SRF will create an active co-management structure in the SRF.

Figure 8.2: Stakeholder Analysis of Co-Management Practices in the SRF



What to do and how to do: The capacity building programme for local government institutions and demarcating the SRF under the political boundaries of local government structure might be useful in engaging local government representatives for co-management activities.

8.1.5 Room for Manoeuvre

Upon completion of the study, it has been observed that partnership and collaboration between the BFD and Forest Dependent Communities has not been institutionalised. Although there is a process of responsibility sharing in the current co-management practice but sharing the profit earned by the BFD with the forest dependent communities might be helpful in preventing illegal activities in the SRF. The most significant contribution of this project is engaging children in the awareness building programme. This inter-generational awareness building and capacity building activities can be scaled-up in numbers and through developing an institutionalised structure. Moreover, the participatory co-management system has to be democratized and automated by introducing smart technologies. Building the capacity of the BFD in implementing the automated participatory co-management system will have a sustainable impact in managing the biodiversity of the Sundarbans. Finally, the intergenerational activity like the study circle programme will create a new generation where the resource dependency on the SRF might gradually decrease and introducing AIGAs will be beneficial for the Forest Dependent Communities to secure their livelihood.

Table 8.1: Summary of Findings and Way Forward

Issues	Findings	Way Forward
Vulnerability due to Covid-19	Joblessness	Introducing Alternative Income Generating Activities
	Price drop of crab and fish	Value chain-based marketing system development
	Illness	Introducing health insurance facilities for Forest Dependent Communities
	Increased Illegal Resource Extraction	Installing Participatory Automated Patrolling System
Livelihood Status of Forest Dependent Community	Lack of skill for AIGAs	Skill based training and seed funding for AIGAs
	Lack of access to finance and grants	Blending safety-net and group savings programme
	Lack of coordination and effective monitoring	Automation of co-management of forest resource and trust building activities
	Poor road connectivity	Establishing co-operative based collections points of forest resources

	Lack of linking capital	Engaging political and administrative local authorities in development programmes
Mitigation measures under SMP Programme of GIZ	Regenerating community groups for better comanagement of the SRF	Democratisation and mobilisation of different tier of co-management system
	More emphasis on women participation in comanagement of the SRF	Restructuring the current structure of CMC
	Engagement of school going children in awareness building activities regarding biodiversity conservation of the SRF	Institutionalising the study circle programme
Gaps in the Mitigation Measures	Lack of Scaling-up of SMART Patrolling System	Extensive capacity building programme
	Protecting Child Marriage	Social awareness and effective monitoring system
	Involvement of children in illegal resource extraction from the SRF	Introducing TVET for the adolescents and savings group for supporting future education
Room for Manoeuvre	Profit Sharing by the BFD	Implementation of Protected Area Rules and developing a mechanism of profit sharing earned by the BFD
	Automation of management system of the SRF	GPS based smart permit for Forest Dependent Communities
	Inter-generational awareness building activities	Establishing adolescent groups

8.2 Concluding Remarks

Although the SMP project started with the goal in regenerating the co-management process of the SRF, but the pandemic context added some additional challenges for the project. Supporting the community and the BFD with different incentives during the pandemic period was noteworthy contribution of SMP as it created a sense of having strategic partner during any crisis period. However, the child-focused graduation model through different awareness building programme of the project focused to create a future generation who will be the change makers in conserving the SRF. This intergenerational capacity building programme might have sustainable impact in managing and conserving the SRF. Additionally, engaging women in co-management process is also contributing to empowering women which addresses the goal number 5 of Sustainable Development Goals: Gender Equality. The capacity building programme for the BFD in operationalising SMART patrolling resembles with the priority of the government agenda and a need-based solution for the BFD. Regenerating the co-management structure established

through different initiatives of different agencies over 20 years period is another significant mitigating measure of SMP in conserving the SRF. The structural measures of the SMP are therefore also contributing to achieving the goal number 14 of SDG: 'life below water'. However, in a community where the persistent challenge is securing income, the integration of activity like AIGA is very crucial in sustaining the success of a programme like SMP. Therefore, this study recommends for scaling-up the present activities with an additional component of integrating AIGA and TVET in reducing the resource dependency of the forest dependent communities in the Sundarbans.

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Annex

Interview Checklist for forest resource dependent households

Interviewer will introduce himself/herself and communicate the following message before the survey to get informed consent of the respondent.

Hello! My name is _____, and I am currently working for the impact study of COVID 19 on the lives and livelihood of the forest resource-dependent communities in the Sundarbans Impact Zones (SIZs). The purpose of this survey is to understand better how social, economic, institutional, and ecological consequences of the COVID 19 pandemic expose high vulnerabilities and inequalities in the livelihood of the forest resource-dependent communities. The information will be used to understand the impact of COVID 19 on livelihood choices of the forest resource-dependent communities and their impact on Sundarbans' resources and biodiversity conservation. The GIZ implements the research project, and the organisation will keep your information privately. Name and other personal information will never be disclosed to anyone. You have been selected by chance to participate in this survey. Your participation is completely voluntary and confidential.

Consent form

I have been selected to take part in this telephone survey or the face-to-face survey. I have heard and understood the explanatory statement and I hereby consent to participate in this research.

I have a consent on the following statement

I agree to interview by the interviewer or research team recruited by GIZ	Yes	No
I understand my participation is voluntary and I can withdraw myself any time of the conversation. Moreover, I can withdraw myself from the GIZ's research project before November 15, 2021, without being disadvantaged in any way.	Yes	No
I understand that any of the data that the research will extract from my interview for use in reports will not contain my name, address or characteristics that might recognise me.	Yes	No
I understand that the information I provide is confidential, and no information given could open to any other reports, projects, or to third party involvement that leads to identification of the participants.	Yes	No
I understand that reports based on the interview can be published later, but without any information that can lead to personal identification.	Yes	No
I consent that my interview can be audio recorded.	Yes	No

Name of the respondent or participant	:
Address [Village, Union, Upazila]	:
HHID	
Mobile number	:
Date of interview	:
Place of interview	:
Mode of interview	:
Name of interviewer	:

Section 1: Fact sheet of the Participant

Age of the respondent (in whole years)	
Sex of the respondent	M=1, F=2, O=3
Education (years)	
Primary occupation	
Secondary occupation	
Other employment	
Marital status	1=Never married, 2=Married (living with spouse), 3=Separated/ deserted, 4=Widow/widower
How many members do you have in your house?	
Any type of disability	

Occupation: 1=Farming (on own and/or others' land); 2=Agricultural day labour or contract labour; 3=Fishing; 4=Poultry and livestock rearing; 5=Non-agricultural day labour or contract labour, 6=Regular salaried employment in government, NGO or other institutions; 7=Regular salaried employment in some fixed business establishment (shop, factory, hotel, etc.) or in transport sector (bus, truck, etc.), 8=Self-employed 9 =Business owner using hired labour; 10=Rickshaw/easy bike/van puller; 11=Boatman; 12=Unpaid household work (e.g., housewife); 13=Servant/ maid; 14=Student; 15=Beggar; 16=Honey hunter; 17=crabber; 18=Nipa leaf collector; 99=Other (specify)

Section 2: Rapid assessment of impact Covid 19 and lockdown of the last month on lives and livelihood of the forest resource dependent households

1. What resources do you normally collect from the Sundarbans? How the resources contribute to your livelihood? [Hint: *how the resources are collected and sold at market?whether resources are used for consumption or not?Whether family members are engaged in this process or not?]*
2. What difficulties or challenges did you face in collecting resources from Sundarbans during the lockdown period? [Hint: *challenges in getting Boat Licensing Certificates (BLCs), permits to collect resources, restrictions to collect products during lockdown, selling the products, taking products to higher market, or offered lower prices of their produces, what you expected to earn and what actually you earned during the lockdown period?]*
3. If having restrictions to collect resources from Sundarbans, how did you maintain your livelihood? [Hint: *what consequences did you face and how did you cope with this situation? food and other necessitates*, *have you transferred your labour and skill to another sector for a short period? If you did, how have you changed your income-earning option?*]
4. During last month, what health problems have you and family members faced? Describe the process of how you have dealt with these health problems? [Hint: *where did you go for treatment? How did you manage to do the treatment? Have the health shocks affected resource collection from the Sundarbans? How did you cope with this situation?*]
5. How far diets were reduced in a month–what items were reduced? Do you think this affected your health? Did it affect work?
6. Did you have to sell or mortgage assets? (Here try to get as much detail as possible – see quantification notes below). Did you get a fair price when you sold your asset or did you sell it under distress conditions, i.e., at cheap prices? If so, why? What was going price for livestock at that time?
7. Did you get any loan from relatives, friends, NGOs, or any financial institutions? Why did you take this loan?
8. Have you got any assistance from BFD or CMCs or GIZ or any other organisations? What assistance did you get? How did you use this assistance?

9. During this lockdown, did you involve in any illegal/prohibited activities (such as fishing in conservation sites, resource collection without permits…)? Why did you decide to do this? How did you manage to escape from the punishment?
10. What assistance are you expected now from local government or CMCs or BFD?

Section 3: In-depth assessment of impact Covid 19 and lockdown on the forest resource dependent households
3.1 Changes in principal livelihoods and working capacity.
1. Before COVID 19 situation, how did you maintain your livelihood? Can you explain the seasonal calendar of your livelihood? How were forest resource collection contributed to your livelihoods? What challenges did you face while maintaining forest resource dependent livelihoods? How are these challenges exacerbated during Covid 19 pandemic situation? What are the new challenges added that exacerbate communities' resource collection from the Sundarbans? [Hint: *challenges in getting Boat Licensing Certificates (BLCs), permits to collect resources, restrictions to collect products, selling the products, taking products to higher market, or offered lower prices of their produces*]
2. How did your livelihoods change - what was your primary and secondary livelihood during COVID 19 in terms of contribution to household income? What did you spend most your time doing? (Over the year and half)
3. Were there changes in your health and ability to work? Did a) illness or b) hunger reduce your ability to: • *Work full days or complete piecemeal work or attend works fewer days?* • *Do only 'easy' low paid works and avoid higher paid works?*
4. Were there changes in other household members work - did any other family members – wives or children do engage or more work to compensate? Did any family members beg? Could your wife work, what did she do? If not, why not? (If there are barriers to women's work, interrogate whether these barriers came into play during the COVID 19 pandemic).
5. How many full-time workers and how many part time workers did you have at that point compared to number of dependents? [*Can you please map out seasonal opportunities and constraints for the respondents and their family members during the pandemic time?*]
3.2 Changes in food consumption
1. How far diets were reduced –what items were reduced during the Covid 19 pandemic? Is there any difference between lockdown and new normal situation? Do you think this affected your health? Did it affect work? Higher unemployment?
2. Were diets reduced more for some household members (e.g., wives, daughters) if so, why?
3. Was any other family spending was reduced (e.g., treatment cost or repaying loans or tuition costs)? Inter-generational consequences for that individual in later life (e.g., sliding to deeper poverty, risk of stopping children education)?
3.3 Changes in productive assets
1. Did you have to sell or mortgage assets? (Here try to get as much detail as possible).
2. Did you get a fair price when you sold your asset or did you sell it under distress conditions, i.e., at cheap prices? If so, why?
3. Who did you sell to (your moneylender, employer, and family member)? Were you ever able to recover these assets? Or purchase other assets? Did you exchange a more expensive for a cheaper asset?
4. Did you send kids out of school to work (education as asset)?

3.4 Tracking cyclones' impacts
1. How were you affected by this year cyclone *Amphan* and *Yass*? Can you explain cyclone's impacts on you and your households? [hint: *specific destruction in agriculture and food items in the house such as rice…., income-earning sources, livestock and poultry, house, any other livelihood assets should be reported*]
2. Whether house was flooded? [hint: water level should be mentioned] How long water stayed? Can you explain in detail? If water is still there, how do you manage your household work like sleeping, cooking, managing poultry/livestock, taking care your children and etc?
3. What happened with you daily livelihood (income earning activities)? How is it affected by the cyclone combined with Covid 19 pandemic?
4. Did you have any health issues for you and family members? How did you manage this situation? [Can you explain the situation you are facing after cyclones?]
5. How did you manage the situation? What actions did you take to manage your situation? [Hint: managing income-earing situation, houses, livestock, and poultry, agriculture/gher…….]
6. What assistance did you take from government (be specific about government organisation like Chairmen/UNO/CMCs……) or NGOs (be specific and name the organisation) and outside civil society organisations? Who helped you and how? -explain
3.5 Social impacts of Covid 19 pandemic situation
1. How are women and children in your family affected during the pandemic situation? [for women respondent, did you have any experience of physical and mental abuse, attack, humiliate, and torture during this pandemic situation? Did you have more violence during this time? If increased, why was it increased? How did you take any actions to improve the situation?
2. How was children education affected? [Hint: *risk of out of school or child labour or child marriage increases*]
3. Did your household separate into two from the pressure of the event and if so, what were the exact circumstances of that separation? Who decided, for what reasons, did you agree, and what was the outcome for you? Were assets split at the same time? How? [Hint: *This includes both separation of parents from adult children, or adult children living separately stop supporting elders. Abandonment, separation, divorce – temporary male migration which becomes permanent (stops sending remittances home)* *Widowhood when husband's kin take assets, and the women loses support from husband's family*.] Did you lose your home?
3.6 Environmental impacts of Covid 19
1. Did you force to involve in illegal/prohibited activities that could have negative effects on biodiversity conservation? (e.g., poaching, fishing in the sanctuary areas, honey, or nipa collection without permits, etc.) How? What would be the consequences of these activities?
2. What needs to be implemented to stop these activities?
3.7 Assistance or support [*Economic Impacts*]
1. Who helped you out? What kind of relations of support did you have and what was the cost of that support? If they did not help you, why not?

2. If you received support from family, from whom, what did they expect in return? Did your family explain why they would not help you? Do you receive any support from family or social networks of support? If so what, did you have to pay interest, and what did you have to do in return? If not, why do they think you are seen as underserving of their support because you did or did not do something?
3. What kind of assistances did you get from the COVID 19 mitigation project? How did you use this? [Hint: humanitarian assistance, institutional network] What positive impacts did you experience in terms of food security, new livelihood opportunity, stable income, financial assistance…...? What additional assistance did you need to improve your situation?
4. If you borrowed from moneylenders, what were the terms of the loan – interest rate and any other promises of work or anything else made? Why did you take a loan and how did you use the loan? Were these lenders also buyers of products and suppliers of inputs), did you have to sell your product (baskets, or shrimp, or paddy) only to that moneylender? Did you try to get a loan? If so, what happened when you tried? If you did not try, why not, describe what you felt you would face?
5. If you borrowed from MFIs/NGOs, what was the rate, how long did you have to wait for the loan, could you repay it, if not, have you ever taken a loan from that MFI again?
6. If you got support from a political figure, did he/she expect favours? Either bribes or voting loyalty to his party? Or unpaid work favours?
If you were entitled to safety nets? If so, why didn't you get them? Did you try but were unsuccessful, explain? If the event was disputes involving the need for police or courts – did you receive any assistance from them, and if not, explain why not?

Interview Checklist for Key Informant Interviews

Interviewer will introduce himself/herself and communicate the following message before the survey to get informed consent of the respondent.

Hello! My name is _____, and I am currently working for the impact study of COVID 19 on the lives and livelihood of the forest resource-dependent communities in the Sundarbans Impact Zones (SIZs). The purpose of this survey is to understand impact of COVID 19 on Sundarbans and the people living around the Sundarbans and assess the role of mitigation measures in increasing functionality of BFD. The GIZ implements the research project, and the organisation will keep your information privately. Name and other personal information will never be disclosed to anyone. You have been selected by chance to participate in this survey. Your participation is completely voluntary and confidential.

Consent form

I have been selected to take part in this telephone survey or the face-to-face survey. I have heard and understood the explanatory statement and I hereby consent to participate in this research.

I have a consent on the following statement		
I agree to interview by the interviewer or research team recruited by GIZ.	Yes	No
I understand my participation is voluntary and I can withdraw myself any time of the conversation. Moreover, I can withdraw myself from the GIZ's research project before August 31, 2021, without being disadvantaged in any way.	Yes	No
I understand that any of the data that the research will extract from my interview for use in reports will not contain my name, address or characteristics that might recognise me.	Yes	No
I understand that the information I provide is confidential, and no information given could open to any other reports, projects, or to third party involvement that leads to identification of the participants.	Yes	No
I understand that reports based on the interview can be published later, but without any information that can lead to personal identification.	Yes	No
I consent that my interview can be audio recorded.	Yes	No

Name of the respondent or participant	:
Designation and Organisation	:
Mobile number	:
Date of interview	:

Place of interview	:
Mode of interview	:
Name of interviewer	:

1. How did COVID 19 outbreaks and lockdown affect BFD's activities (i.e., biodiversity conservation? [Hint: BFD's patrolling activities, issuing BLC, permits to resource collection, visitors' entry pass, etc.] How did COVID 19 increase health risks of frontline workers of the BFD?
2. How did COVID 19 affect forest resource dependent communities or resource collectors? Is illegal resource collection increased during the pandemic situation? How did you mitigate illegal resource collection in the Sundarbans? What measures did you take?
3. Can you explain the role of the mitigation project (or CNRS/GIZ) in ensuring the health safety of the BFD's offices (stations or range offices) and front-line workers? Is there any gap? How would gaps be mitigated? Can you explain the support of the COVID 19 mitigation project (or CNRS/GIZ) in continuing regular business of the BFD? [Hint: BFD's patrolling activities, capacity development (drone) issuing BLC, permits to resource collection, visitors' entry pass, etc.]
4. How would you evaluate GIZ's infrastructural support to continue BFD's operation and communities' physical communication?
5. How would you evaluate GIZ's knowledge and human capital development services to increase awareness of biodiversity conservation?
6. What measures should be taken to increase biodiversity conservation in the Sundarbans?

Interview Checklist for school going children and their parents

Interviewer will introduce himself/herself and communicate the following message before the survey to get informed consent of the respondent.

Hello! My name is _____, and I am currently working for the impact study of COVID 19 on the lives and livelihood of the forest resource-dependent communities in the Sundarbans Impact Zones (SIZs). The purpose of this survey is to understand impact of COVID 19 on school going children and also assess the role of mitigation measures in enhancing children education and awareness regarding biodiversity conservation. The GIZ implements the research project, and the organisation will keep your information privately. Name and other personal information will never be disclosed to anyone. You have been selected by chance to participate in this survey. Your participation is completely voluntary and confidential.

Consent form

I have been selected to take part in this telephone survey or the face-to-face survey. I have heard and understood the explanatory statement and I hereby consent to participate in this research.

I have a consent on the following statement		
I agree to interview by the interviewer or research team recruited by GIZ.	Yes	No
I understand my participation is voluntary and I can withdraw myself any time of the conversation. Moreover, I can withdraw myself from the GIZ's research project before November 15, 2021, without being disadvantaged in any way.	Yes	No
I understand that any of the data that the research will extract from my interview for use in reports will not contain my name, address or characteristics that might recognise me.	Yes	No
I understand that the information I provide is confidential, and no information given could open to any other reports, projects, or to third party involvement that leads to identification of the participants.	Yes	No
I understand that reports based on the interview can be published later, but without any information that can lead to personal identification.	Yes	No
I consent that my interview can be audio recorded.	Yes	No

Name of the respondent or participant	:
Mother's name	
Father's name	

Address [Village, Union, Upazila]	:
HH Type (VCF-RUs/VCF-non-Rus/Non-VCF Rus/Non VCF-Non-Rus)	
HHID (Student Database)	
Mobile number	:
Date of interview	:
Place of interview	:
Mode of interview	:
Name of interviewer	:

Section 1: Fact sheet of the Participant

For child respondent	
Name	:
Age	:
Class	:
Status (started working outside during Covid 19)	: Yes =1 No=2
For Parents (Father/Mother)	
Age of the respondent (in whole years)	
Sex of the respondent	M=1, F=2, O=3
Religion	Muslim=1, Hindu=2, Christian=3, Other=4
Education (years)	
Primary occupation	
Secondary occupation	
How many members do you have in your house?	
Any type of disability	

Occupation: 1=Farming (on own and/or others' land); 2=Agricultural day labour or contract labour; 3=Fishing; 4=Poultry and livestock rearing; 5=Non-agricultural day labour or contract labour, 6=Regular salaried employment in government, NGO or other institutions; 7=Regular salaried employment in some fixed business establishment (shop, factory, hotel, etc.) or in transport sector (bus, truck, etc.), 8=Self-employed 9 =Business owner using hired labour; 10=Rickshaw/easy bike/van puller; 11=Boatman; 12=Unpaid household work (e.g., housewife); 13=Servant/ maid; 14=Student; 15=Beggar; 16=Honey hunter; 17=crabber; 18=Nipa leaf collector; 99=Other (specify)

Section 2: For children

1. Let us start our discussion by talking about the most pressing problem you and children of your age are facing in this rural neighbourhood/community. In your opinion, why are the most pressing problems of you and children in your area? Probe: Basic Education, Child Protection Why do you think these problems are occurring? Probe: Why do they believe this way?
Whether and how these problems become worse or better during pandemic situation?

2. Let us talk about coronavirus. Imagine about your situation and your friend's situation before and after corona virus. Please tell me about the situation before and after Corona virus.
Probing item: *who is more affected? How did the pandemic affect the children's situation; what are the new needs due to the virus?*

3. During the pandemic situation, what challenges do your family face? How do your family manage this situation? Probing item: *Are you typically involved in child-labour? If so: - What types? Have you involved in collecting Sundarbans' resources? How do you manage these activities?*
4. What are the aspiration of you? What are the challenges to achieve your aspiration? Probing item: *child abuses or child marriage* Is there any sign of violence and abuse against children? Are these abuses increased during pandemic situation? what types of violence and abuse are practiced towards boys and girls in your family or community? Specific risk of sexual violence for girls and boys and how different forms viewed by family and community? Have you ever been reported of such violence? What was the outcome of this reporting? Is there any sign of children marriage in your community? Are child marriages increased during pandemic situation? If so, why? What needs to be implemented for stopping violence, abuses against children and children's marriages?
5. What initiatives are already undertaken from GOs or NGOs to enhance your education and addressing other needs of the children? How effective were these initiatives? Probing item: *Ask the role of different activities such as group study, playing equipment, art competition, street drama, received Sundarbans book, ludu, different day celebration- How did they feel? How are these activities contributed to their learning and formal education? How did you maintain/apply the prevention measure for Covid (behaviour changes), What did they learn regarding biodiversity conservation? Whether and how did they apply their knowledge?*
6. What assistances are they expected from external organisations to resume their formal education and reach their aspirations?

Section 3: For parents
1. How did your livelihoods change - what was your primary and secondary livelihood during COVID 19 in terms of contribution to household income?
2. What consequences did you face in terms of income or asset loss, children education, social network, etc.?
3. In your opinion, how did COVID-19 affect the situation (day-to-day) life of this community in general and your situation (as parents) in general?
4. What is parents' perception about quality learning? What is parents' perception about school environment (physical/social/ emotional/ access for all minority groups/ disable children)? What is their expectation from teacher, education officials, community, SMC regarding child's development? How parents support their children at home/schools for quality learning/education? How does School and School Management Committee engage with parents in improving children's learning? Are they active in the pandemic situation? If so, how? How do parents advised on the ways that they can support, monitor, and advocate for their children's education (including their learning, not just their attendance and behaviour)? How?
5. Can you explain child marriage in the community? If we like to reduce Child Marriage what types of initiatives can be taken? How can you contribute to reduce violence and child marriage?
6. Did you see any effects of COVID 19 on child labour? What needs to address this child labour situation in your area?

7. What initiatives are already undertaken from GOs or NGOs to enhance your education and addressing other needs of the children? How effective were these initiatives? [Probing item: *Ask the role of different activities such as group study, playing equipment, art competition, street drama, different day celebration*.] Are these initiatives undertaken by BEDS effective to increase awareness of children and adolescents regarding biodiversity conservation? Can you explain bit detail on this issue?
8. What specific actions should BEDS/GIZ do to minimize these negative effects due to COVID-19?
9. Were there any positive gains (if any) due to COVID-19 responses? Could you please tell us more about these positive changes in your life and the broader community here? What could have been done more and better to enhance the positive effects?
10. What are the new needs by parents because of COVID-19?

Interview Checklist for Experts and Representatives of Bangladesh Forest Department

Questions

1. What are the major threats to the Sundarbans? Whether and how covid 19 exacerbate this situation?

2. To what extent Sundarbans-dependent communities are affected during covid 19 combined with lockdown situation?

3. What are the expected outcomes that you planned to achieve while designing mitigation measures of the Covid 19? To what extent are the outcomes achieved in the local context?

4. What are the major challenges of implementing effective co-management in the Sundarbans? Whether and how covid 19 exacerbates the implementation process of building effective co-management in the Sundarbans?

5. Whether and how the SMP I and SMP II are successful or failing to achieve desired outcomes? [e.g., building effective institutional arrangements, capacity building, gender sensitivity, women participation in co-management and institutional engagement, democratization, and effective leadership development, etc.] [having some field reflections to share with the experts to validate]

6. Can you please discuss two issues such as SMART and gender sensitivity in co-management? [how SMART operates and contributes to forest management? How does GIZ help SMART to have desired outcomes?] [Gendered role in co-management, how effective is SMP's gender focus in building an effective co-management process?] [having some field reflections to share with the experts to validate]

7. Can you please explain some other support to the BFD for building effective forest management in the Sundarbans? To what extent are these supports effective?

8. To what extent does BFD have willingness to implement effective co-management in the Sundarbans (sharing responsibilities with communities, e.g., VCFs, PFs, CMECs)? [having some field reflections to share with the experts to validate]

9. Whether local government inclusion is worth developing effective co-management or not? [having some field reflections to share with the experts to validate]

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Registered offices
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Address
Sundarbans Management Project (SMP-II)
GIZ Bangladesh
PO Box 6091, Gulshan 1
Dhaka 1212, Bangladesh
T + 880 2 5506 8746-52
F + 880 2 5506 8753

giz-bangladesh@giz.de
www.giz.de/bangladesh

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Author/Editor, etc.:
Md. Zakir Hossain, Ph.D.
Professor, Urban and Rural Planning Discipline
Khulna University, Khulna-9208
Email: zakir@ku.ac.bd

Bonani Chumky,
M&E and Communications Advisor,
Sundarbans Management Project (SMP-II), GIZ BD
Email: Bonani.chumky@giz.de

Responsible:
Dr. Stefan Alfred Groenewold
Principal Advisor
Support to the Management of the Sundarbans
Reserved Forest Project (SMP-ll),
E-mail: stefan.groenewold@giz.de

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