2021

LOCAL GOVERNMENT INITIATIVE
ON CLIMATE CHANGE (LoGIC)

ANNUAL PROGRESS REPORT

LoGIC

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LIST OF ACRONYMS

AE	Accredited Entity (to GCF)
AWP	Annual Work Plan
CALO	Climate Adaptive Livelihood Option
CCA	Climate Change Adaptation
CFF	Climate Fiscal Framework
CRA	Community Risk Assessments
CRF	Community Resilience Fund
CSO	Civil Society Organization
CVI	Climate Vulnerability Index
DEM	Digital Elevation Model
DMC	Disaster Management Committee
DPP	Development Project Proforma
DRR	Disaster Risk Reduction
EU	European Union
FYP	Five Year Plan
GCF	Green Climate Fund
GED	General Economics Division
GoB	Government of Bangladesh
HH-RRAP	Household Risk Reduction Action Plan
LCFF	Local Climate Fiscal Framework
LDP	Local Development Plan
LGD	Local Government Division
LGI	Local Government Institution
LGSP	Local Government Strengthening Project
LoGIC	Local Government Initiative on Climate change
M&E	Monitoring and Evaluation
MIS	Management Information System
MoDMR	Ministry of Disaster Management and Relief
MOU	Memorandum of Understanding
MPTF	Multi Partner Trust Fund
NDA	National Designated Authority (to GCF)
NIM	National Implementation Modality
NOC	No Objection Certificate (from NDA to GCF)
NPD	National Project Director
PBCRG	Performance-Based Climate Resilience Grants
PIC	Project Implementation Committee
PMU	Programme Management Unit
PSC	Project Steering Committee
RRAP	Risk Reduction Action Plan
SIDA	Swedish International Development Cooperation Agency
ToR	Terms of Reference
UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Programme

LoGIC IN BRIEF

Title of the Action	**Local Government Initiative on Climate Change (LoGIC)**
Location of the Action	**Seven Districts in Bangladesh (Khulna, Bagerhat, Patuakhali, Barguna, Bhola, Kurigram, Sunamganj)**
Start and end date of the Action	**From 1st of January 2017 to 31st of December 2022**
Value of the Action (Total of two agreements with UNDP & UNCDF)	**UNDP: USD 20,176,507.21 UNCDF: USD 15,451,195.56**
Name of partner in Action	**Local Government Division, Ministry of Local Government, Rural Development and Co-operatives, UNDP and UNCDF.**
Name of beneficiary organizations of grant contract	**UNDP and UNCDF**
Name and title of the Contact Person	**Sudipto Mukerjee, Resident Representative, UNDP Bangladesh**
EU Contribution Agreement	**ENV/2016/380-240 ENV/2016/380-241**
Purpose of the Action	**GCCA+ support for enhancing communities' resilience to climate change and related disasters.**
Target Beneficiaries	**400,000 most vulnerable people in 72 unions in seven districts. 1,008 local elected representatives and officials in 72 Union Parishad of seven districts.**

EXECUTIVE SUMMARY

As the first year of the Local Government Initiative on Climate Change (LoGIC) project's two-year extension period, 2021 was a year focused on strengthening the project's climate change narrative and core processes toward a sustainable graduation model, ensuring long-term climate resilience of the project communities. To this end, LoGIC pursued the following activities:

» Conducted a climate risk assessment through a blend of bottom-up and top-down approaches;

» Reached the most climate vunerable households with standard grant packages and less climate vulnerable people with capacity building support;

» Scaled-up the most viable climate resilient livelihood options and gave access to the formal credit market;

» Engaged the private sector and co-designed business models for scalable and commercially viable climate resilient livelihoods;

» Engaged climate vulnerable youth in project activities, including social auditing and adaptation enterprises;

» Promoted nature-based solutions.

LoGIC's commitment to strengthening its climate change narrative was reflected in the inclusion in the Community Resilience Fund (CRF) scheme of an additional 18,000 households from the 72 most climate-vulnerable wards, which are 100% headed by women. Since the project's inception, a total of US$ 9.72 million has been disbursed to 35,000 households as financial support. An additional 10,000 non-grant recipient households are undergoing the selection process. Furthermore, the CRF grant recipients received skills and knowledge training on climate adaptive livelihood options (CALOs), including around diversification of existing agricultural knowledge, as well as scientific methods to rear livestock and adapted pisciculture. All beneficiaries are now implementing at least one CALO, and 74% of beneficiaries have gained positive economic benefits. Additionally, the project supported the CRF grant recipients to form cooperatives with legal, organizational structures which are enabling beneficiaries to deposit periodic savings – a practice which 82% of grant recipients are already implementing. The financial security gained through these initiatives will ensure that vulnerable households are cushioned against shocks and disasters.

In the FY 2020-2021, a total of 200 PBCRG funded climate change adaptation (CCA) schemes were undertaken in the UPs. These schemes include, amongst others, initiatives relating to agriculture, health and sanitation, water, and adaptive infrastructure. To date, LoGIC has disbursed a total of US$ 7.91 million to UPs as Performance-Based Climate Resilience Grants (PBCRGs) to implement 653 community-level schemes to build climate resilience. A significant outcome of the project in 2021 included the integration and streamlining of CCA schemes in the UPs. The 72 UPs planned a total of 863 CCA schemes, out of which only a total of 200 schemes were funded by LoGIC's PBCRG. This indicates that local governments are more aware of and educated on issues relating to climate change and further underscores LoGIC's success in achieving long-term local ownership of climate adaptation and resilience measures.

LoGIC has identified Bangladesh's youth as key drivers for climate resilience and climate action, and as a result, the project developed a youth strategy to enhance youth engagement in CCA schemes in the working areas. LoGIC has completed the mapping and identified 8,872 youths from climate-vulnerable communities and project beneficiaries' families to engage them in project activities and ensure intergenerational change for climate resilience and adaptation for the sustainability of overall efforts beyond the project period. In this year alone, 219 youth groups have been launched across seven districts. Through capacity building and education training, the identified youth will simultaneously be empowered to become active change-makers at the grassroots level.

In 2021, the project also consulted an expert to prepare a Climate Vulnerability Index (CVI) for nationwide data mapping up to the LGI level (Union, Municipality, City Corporation). The CVI can in turn assist the Government in allocating its development grants to the most climate-vulnerable areas of Bangladesh as part of its ongoing adaptation efforts. This will strengthen the capacity of vulnerable people and local stakeholders for accountable planning and financing on climate change adaptation and disaster risk reduction measures and enhance the access of local governments and households to climate financing. LoGIC has also initiated an inter-ministerial committee to advance the development and implementation of the Index.

In 2021, LoGIC established two new partnerships: (1) with BRAC, which aims to ensure capacity building on CALOs for CRF beneficiaries and create linkages with the private sector for identifying scalable business opportunities; and (2) with the Bangladesh University of Engineering Technology (BUET) and Center for Natural Resources Studies (CNRS) in order to design and implement PBCRG schemes to promote nature-based solutions for climate change-induced hazards.

Overall, the delivery results in 2021 demonstrate high performance towards LoGIC's intended results, despite the challenges posed to the project by the ongoing COVID-19 pandemic, which lasted for much of the reporting period. LoGIC beneficiaries found themselves not only affected by climatic disasters such as Cyclone Yaas, but also by the unprecedented global health crisis that caused severe socio-economic impacts and forced many into even deeper levels of poverty. The pandemic, more acutely than ever before, highlighted the need for increasing communities' resilience to shocks and disasters and underscored the vital importance of LoGIC's work in light of increasingly frequent climatic disasters. Despite the challenges, including an initial delay in the start of the project's activities, LoGIC has successfully established itself as an effective climate finance mechanism for the communities and LGIs, with lower transaction costs and higher adaptation benefits. The project's exemplary contributions to climate change adaptation in Bangladesh were recognized in the Government's Mujib Climate Prosperity Report 2030 presented at COP26. This acknowledgement at the largest international climate conference of the year marked a significant milestone for LoGIC.

In relation to the agendas discussed at COP26, LoGIC has established itself as a sustainable model for strengthening CCA actions, thereby translating the international goals and pledges into actions at local levels. As LoGIC is entering the final year of its extension phase, the project is committed to fully optimising its core processes and making further processes towards its end goal of transforming the project into a mainstreamed mechanism implemented nationwide at the local level, building resilience of the most climate-vulnerable communities of Bangladesh.

COUNTRY CONTEXT

Bangladesh has not only been ranked one of the fastest-growing economies, but it is also the second-largest economy in South Asia, set to graduate from its LDC status in 2026. While Bangladesh has experienced tremendous economic growth over the past years, the disastrous effects of climate change have posed a consistent threat to its development. Often cited as one of the world's most climate-vulnerable countries, Bangladesh's unique physiographic location, flat deltaic topography, and socio-economic infrastructure make it particularly vulnerable to extreme climate variability and climate change-induced disasters, including storm surges, floods, cyclones, salinity intrusion, landslides, and erosion.

Combined with one of the world's highest population densities and poverty incidence, as well as a population that is heavily reliant on crop farming, the effects of climate change will further aggravate the existing stresses that already impede development in Bangladesh, particularly by reducing water and food security and damaging essential infrastructure. While vulnerable communities have developed their home-grown adaptability measures to deal with natural disasters, the sheer magnitude of multiple impacts of disasters often overwhelms the traditional coping mechanisms at the local level. Rural households in Bangladesh are spending a staggering 158 billion Taka (almost US$ 2 billion) annually to prepare for and respond to the impacts of frequent climate disasters. Families have to divert money away from basic necessities such as food, health, and education in order to repair damaged houses and replace livestock and destroyed crops – an added burden amidst a prolonged pandemic. Disaster-affected households are often left with no choice but to borrow money from informal sources with high interest rates, pushing them into a perpetual cycle of financial insecurity and deep poverty. Furthermore, vulnerable communities have limited access to knowledge, skills, technology, and funds for climate change adaptation, as well as limited capacity to influence local development plans.

The impacts of climate change are largely gendered, exacerbating the pre-existing inequalities and vulnerabilities that women in Bangladesh face, including entrenched gender norms and reproductive responsibilities. Women's lack of control over capital, limited economic opportunities, and lack of voice in decision-making further impede their ability to adapt to and overcome challenges posed by climate change. As their average income is much lower, female-headed households spend three times more as a share of their income on addressing the effects of climate change than households headed by men, further entrenching gender inequalities.

The Government of Bangladesh (GoB) recognizes the importance and urgency of climate action and has mainstreamed related concerns into its national development policy planning and financing. The Government's national climate change strategy and action plan (BCCSAP, 2009) provides programmatic direction, and local government institutions (LGIs) are mandated to implement many adaption and mitigation measures. However, the absence of a systematic approach to integrating climate change into planning and budgeting, both at the national and local levels, has meant that mandated measures are not frequently translated into concrete action. The Government is further constrained by inadequate public finance to promote climate change adaptation at scale and insufficient access to international climate finance for local-level adaptation of the most vulnerable people.
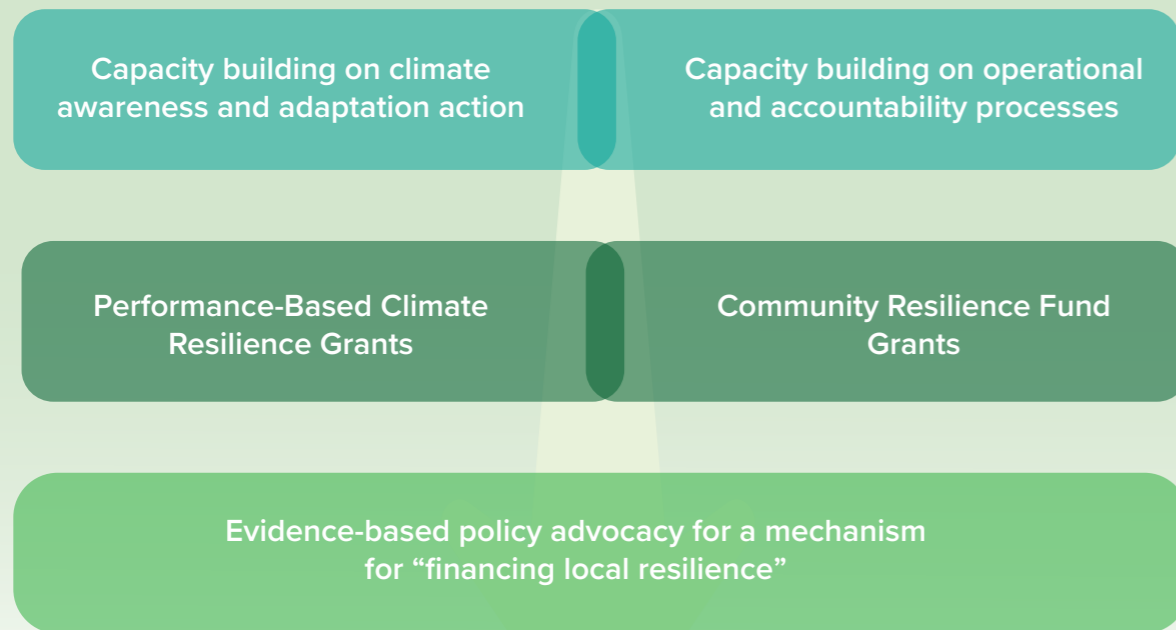
At the local government level, a limited understanding of the impacts of climate change, coupled with a skills gap to incorporate climate change concerns in the regular planning process, are constraining adaptation measures. In addition, a lack of direct access to climate change finance and inadequate accountability in the planning and budget process further restrain local adaptive capacity. As Bangladesh is expected to graduate from its LDC status in 2026, it needs to prepare for a smooth and sustainable transition. While LDC graduation will present many opportunities for Bangladesh, it also entails the loss of various international support measures, including those targeted for climate change concerns such as GEF's LDC Fund. It is thus crucial for Bangladesh to find sustainable solutions to adapting to climate change and increasing its resilience in the years leading up to graduation and beyond.

PROJECT BACKGROUND

The innovative 'Local Government Initiative on Climate Change' (LoGIC) project was launched in 2017 as a joint initiative of UNDP, GoB, EU, SIDA, and UNCDF. **LoGIC is a forward-looking solution to enhance the resilience to climate change and related disasters of the most climate-vulnerable communities in hard-to-reach areas across seven districts in Bangladesh.** It aims to strengthen the capacity of Local Government Institutions for accountable planning and financing on CCA and Disaster Risk Reduction (DRR) mechanisms that will ensure long-term local resilience.

The LoGIC model pursues three strategies for climate adaptation and resilience:

1. **Building capacity** of local governments, vulnerable households, and other relevant stakeholders to adapt their livelihoods, nand enhance existing and future local development plans by integrating CCA and DRR solutions.

2. **Establishing a finance mechanism** for local governments to implement climate change adaptation solutions through its PBCRG schemes, as well as for vulnerable households through its CRF schemes.

3. Ensuring that the pilot experience gained through the project at the local Government and household level informs wider policy- and decision-making, ultimately aiming at improving and **reforming the planning and financing system** of the Government for CCA at the local and community level, thus ensuring sustainability beyond the project.

Capacity building on climate awareness and adaptation action

Capacity building on operational and accountability processes

Performance-Based Climate Resilience Grants

Community Resilience Fund Grants

Evidence-based policy advocacy for a mechanism for "financing local resilience"

CLIMATE RESILIENT COMMUNITY INFRASTRUCTURES AND RESILIENT HOUSEHOLDS

2017 & 2018
LoGIC system development, Community Risk Assessment, RRAP, knowledge products

2019 & 2020
Grants support to HHs and LGIs to implement CCA

2021 & 2022
Leverage climate financing from outside of the project and establish pathways to graduate from a vulnerabilities to resilience regime

The LoGIC Journey

Since project inception, LoGIC has provided adaptation training to 23,000 households and, through its PBCRG and CRF schemes, the project has till date delivered climate finance to 72 Unions and the country's 400,000 most climate-vulnerable households for planning, financing, and implementing CCA solutions both at the community and household level. As such, it has established itself with prominent visibility and responsiveness of the central Government, particularly at higher levels for more effective buy-in. The Government has recognized the potential of the project's climate finance model to be scaled up nationally and mainstreamed into Government policies.

LoGIC is working in 72 Unions of 19 Upazilas across seven districts in Bangladesh. The area selection criteria were (1) Exposure to climate hazard and risk i.e. salinity, sea level rise, cyclones and floods; and (2) Concentration of extreme poverty based on the poverty map of Bangladesh and a household income and expenditure survey.

Kurigram
Sunamganj
Patuakhali
Bhola
Khulna
Bagerhat
Barguna
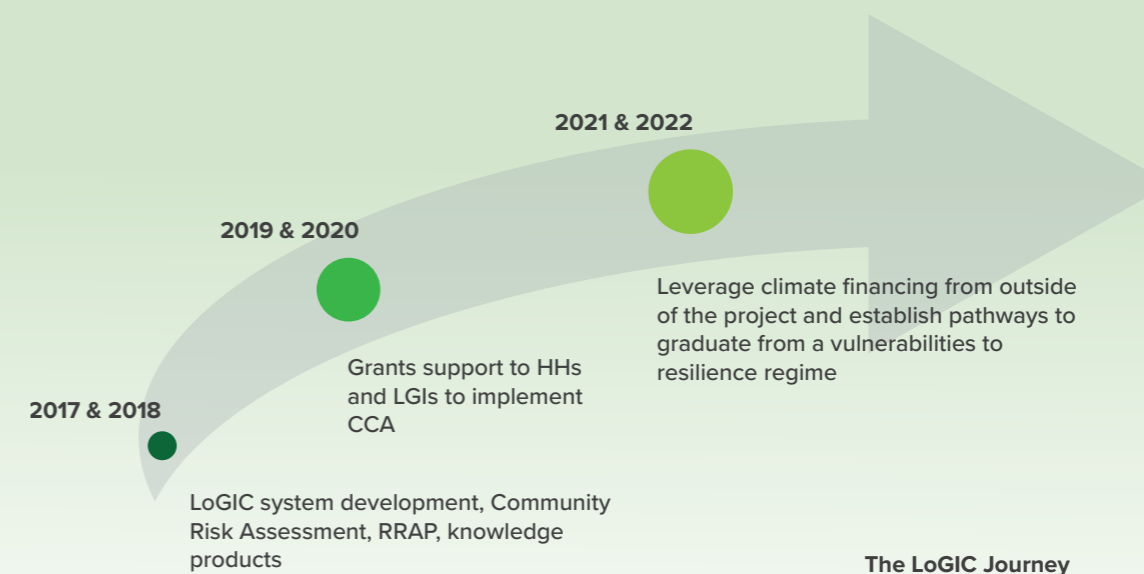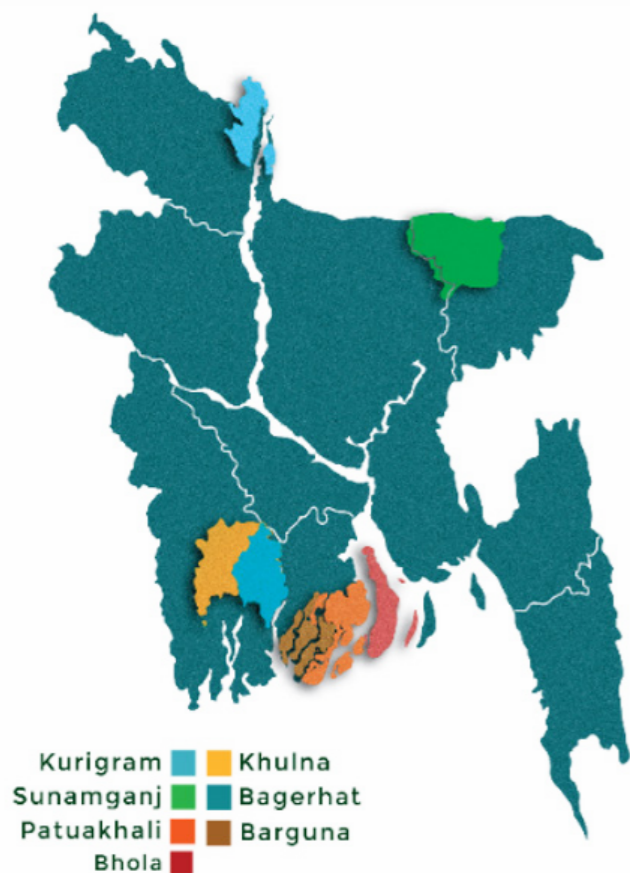
The LoGIC model follows the principle of "Leave No One Behind" (LNOB) by ensuring a whole of society approach that engages diverse stakeholders, including ethnic minorities, persons with disabilities, and marginal occupation groups, in the Community Risk Assessment (CRA) and the development of risk reduction plans at the community level.

To address disproportionate gender-based climate change vulnerabilities, LoGIC has also taken a gender-transformative approach to climate finance. 99% of the 35,000 CRF beneficiaries are exclusively women who are highly vulnerable to different climate variabilities and extremes and left out from other sectoral adaptation efforts of the GoB and development partners. These women are given the requisite skills and a start-up grant to pursue CALOs. This has simultaneously enhanced the financial inclusion of the women beneficiaries who previously did not have access to a formal banking system. Overall, this has contributed to enhanced confidence among the women beneficiaries, reflected in their economic and social empowerment within their communities.

Initially designed as a four-year project, the proven success of the LoGIC model, coupled with the need for establishing sustainable pathways to graduate from vulnerabilities to resilience regimes, have led to a two-year extension of LoGIC with support from the EU, SIDA, and the GoB. This extension phase will support an additional 200,000 climate vulnerable households and ensure that beneficiaries gain long-term resilience against climate change-induced shocks and disasters.

KEY ACHIEVEMENTS 2021

USD 9.72 million disbursed to **35,000** CRF beneficiaries (since inception) to increase their climate resilience.

USD 7.91 million disbursed to 72 UPs as PBCRG to implement **653 community-level CCA schemes** (since inception)

99% of the 35,000 CRF benficiaries are **women,** ensuring equitable solutions for CCA

CALO training provided to **6000** new CRF beneficiaries, increasing their resilience against climate-induced income shocks

74 new vulnerable wards were chosen from **55 UPs** based on field demand, climate science data and secondary sources

18,000 new **hard-to-reach** beneficiaries (100% women) selected

CCA has been streamlined in all 72 UPs, which planned **863** CCA schemes (only 200 PBCRG supported), an increase in awareness among LGIs

200 CCA schemes implemented through PBCRG support**,** benefitting **331,595** people (55% women)

100% of new CRF beneficiaries have opened individual bank accounts, increasing their financial inclusion.

80% of CRF beneficiaries have completed two types of CALO and **100%** have finished at least one type

74% of beneficiaries have gained positive income benefit (1:<1) from implementing CALOs

54% of the beneficiaries have started savings in groups and depositing their money to their group accounts

24 UPs updated their Risk Reduction Action Plans (RRAP) which were also integrated in their 5-Year Plans

Risk Atlas developed to identify, quantify and analyze natural hazards, exposures and vulnerabilities at the UP level

Climate Vulnerability Index (CVI) developed to strengthen CCA planning and financing at the LGI level

225 new youth groups formed across **7** districts to engage engage youth in CCA actions, ensuring intergenerational change

143 youths trained to become sheep insurance agents and **144** to become sheep service providers

Recognized in Bangladesh's Mujib Climate Prosperity Plan 2030 at **COP26** for its exemplary contributions to CCA

CAPACITY STRENGTHENING

To achieve long term local-led adaptation, LoGIC is committed to strengthening the capacity of local governments and stakeholders, as well as community members, for climate adaptative and risk-informed planning and budgeting with a high degree of accountability and inclusivity.

Enhancing their awareness and knowledge of climate adaptation strategies ensures that local communities are empowered to lead sustainable and effective adaptation to climate change at the local level. Achieving local ownership is a central aim of LoGIC to ensure that adaptation solutions are equitable, informed by local priorities, and factoring in local knowledge and expertise. Ultimately, this will ensure that local governments and vulnerable households can sustain and scale-up CCA initiatives beyond the project's duration.

Local governments – closest to the people and the action – are increasingly acknowledged as central to climate change adaptation and building resilience to climate hazards. LoGIC recognizes the unique position of local governments to influence behavioral change both at the individual and community level and provides opportunities for CCA to be integrated into local planning through various initiatives. In 2021, the project provided training and capacity development on climate adaptive livelihood options, adaptive infrastructures, social audit, and nature-based solutions to 72 Union Parishads and Upazila-level officials. To strengthen climate modeling, as well as risk updating and prioritization, LoGIC developed a Risk Atlas and Hazard Map to serve as a base reference for identifying, quantifying, and analyzing risks in the form of natural hazards, exposures, and vulnerabilities at the UP level. This will support local governments to understand the nature of climate change, make forecasts, and adequately prepare for climate hazards.

LoGIC also ensured the involvement of vulnerable communities in local planning by facilitating the participation of the 18,000 newly selected CRF beneficiaries in the development of the Local Government's Household Risk Reduction Action Plan (HH-RRAP). Furthermore, the project supported the 72 UPs to organize community level meetings to update climate risk-informed annual local development plans, as well as the Risk Reduction Action Plans (RRAP). To build the capacity of local stakeholders to design and implement accountability mechanisms, LoGIC organized trainings social auditing across four Unions.

At the community level, LoGIC is raising awareness on local-led adaptation among all beneficiaries and relevant stakeholders of the local government institutions. This year, the project organized 16 sessions of broadcasting CCA initiatives through community radio programs across four districts. To increase the climate resilience of vulnerable households, LoGIC is conducting trainings on 23 different CALOs. The trainings equip the beneficiaries with the requisite technical skills and knowledge, which empower them to pursue alternative means of livelihoods, minimizing climate change-induced livelihood vulnerabilities and therefore offering greater social protection. By transforming productive livelihoods, as well protecting and adapting to changing climate conditions, the project provides a long-term adaption strategy rather than simply reinforcing coping mechanisms.

Alongside the training, the beneficiaries receive seed money through the CRF grants to invest in their new CALOs. In 2021, LoGIC selected an additional 18,000 CRF beneficiaries, of which 100% are women. These women have formed 923 groups to implement their CALOs and developed a business plan after an orientation session facilitated by the project. Thus far, 6000 of the newly selected beneficiaries have received training on CALO. Out of 17,000 beneficiaries from the previous cycle, 100% have completed at least one type of CALO, 74% of women have gained positive economic benefit and 82% of women have started savings.

To improve the resilience of vulnerable women who rear livestock against harsh climate conditions, LoGIC designed and pioneered Climate Adaptive Insurance Coverage (Sheep Insurance).

Through these various capacity building initiatives, LoGIC beneficiaries now enjoy improved living standards in terms of housing, health and nutrition, sources of drinking water, and household assets.

SUNFLOWERS BRIGHTENING UP WOMEN'S LIVES IN KHULNA

Sima Sana, living in Khulna, is already feeling the effects of climate change in her daily life. Sea level rise, increasingly frequent cyclones, and intensifying salinity intrusion are destroying many of the traditional livelihood options in the area.

"High tides and cyclones are causing salinity in our lands and destroying our crop production every year. We lost our rice and vegetable crops due to tidal floods and salinity intrusion, and with it our livelihoods. We struggled to make ends meet," said Sima.

Not only Sima, but all residents of climate vulnerable villages in Bangladesh are facing uncertain futures as salinity levels are expected to rise even further in the next two decades.

While livelihood diversification is key to building climate resilience, most families lack the knowledge, technology, and finances to test alternative, climate-resilient livelihood options.

With the support of LoGIC's CRF scheme, Sima was able to invest in saline resistant sunflower cultivation, resulting in a good yield, despite high levels of salinity in the area. **"We nurtured the sunflowers on the field every day, and within two months, our hard work paid off and we were successfully able to harvest saline tolerant sunflower seeds,"** she said with a smile.

"We ground these seeds to make oil. We have put aside some of the oil for our year-round consumption and sold the rest at a profit. The revenue has enabled us to expand the sunflower cultivation to a bigger scale and has given us a stable income source," Sima explained.

She is now working with other fellow LoGIC beneficiary women to develop a year-round business plan to ensure the optimal use of their CRFs. LoGIC's unique model has helped women such as Sima to gain confidence by enabling them to pursue adaptive livelihoods and ensuring their financial inclusion.
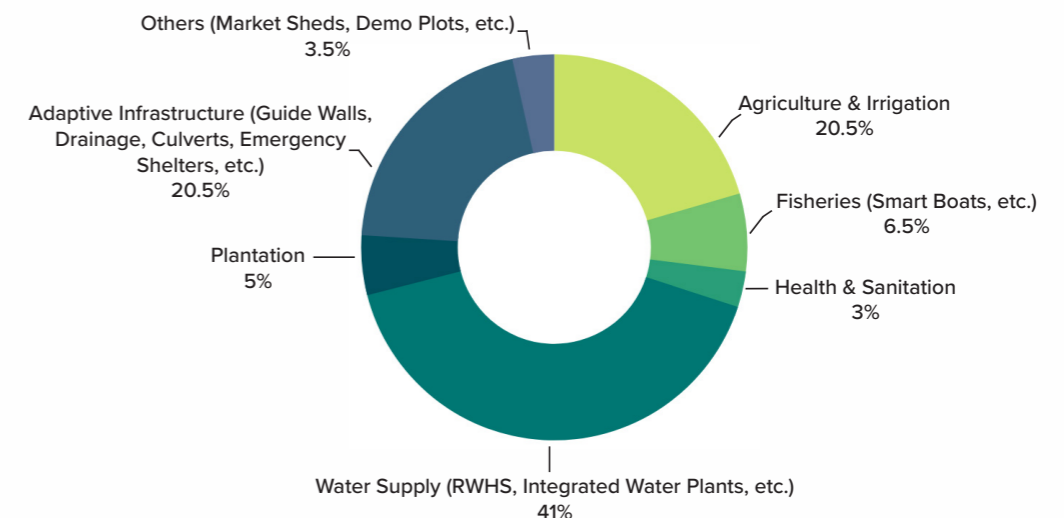
FINANCE MECHANISMS

Adaptation strategies cannot offer sustainable solutions for climate adaptation unless they are supported by adequate finances. To utilize their strengthened capacity, LoGIC has established an effective climate finance mechanism that supports local governments and vulnerable households to plan and implement climate change adaption solutions. LoGIC has established two finance mechanisms: (1) a Performance-Based Climate Resilience Grant (PBCRG) to support local governments to make investments for strengthening climate resilience; and (2) a Community Resilience Fund (CRF) to channel grants directly to households vulnerable to negative climate change and disaster impacts.

Since the project's inception, LoGIC has disbursed US$ 7.91 million to 72 UPs through its PBCRGs to implement 653 community-level schemes for climate resilience. While LoGIC's Baseline Study from 2018 found that only 13.9% of the 72 UPs reported the implementation of climate change related schemes as part of their local development plans (LDP), the year 2021 saw the integration and streamlining of climate change adaptation (CCA) solutions into the local development plans (LDP) of all the targeted local governments. The 72 UPs implemented a total of 863 CCA schemes, out of which LoGIC only supported 200 schemes. 68% of schemes were financed through the mobilization of funds from other sources (e.g., ADP allocation, Own Source Revenue, Private Funds, Co-Financing by other donors/projects). This indicates a significant increase in awareness of climate change related concerns, as well as local ownership of adaptation measures as a result of LoGIC's advocacy and capacity-building work.

Nature-based solutions (NbS) continue to be a priority for LoGIC when designing PBCRG schemes. This ensures CCA actions are sustainable and do not cause any harm. Examples of NbS implemented by LoGIC include: (1) the preservation of rainwater for drinking in salinty prone areas; (2) the use of solar irrigation for agriculture; (3) the pilot and transfer of technology using vetiver grass to reduce soil erosion; and (4) the facilitation of mangrove plantation and swamp forestation to prevent the damage of of cyclones and floods in Sunamganj, Khulna, and Bagerhat.

The 200 PBCRG supported schemes implemented this year benefited approximately 331,595 vulnerable community members, out of which 55% are women. The areas of focus of the LoGIC supported schemes can be found in the chart below.

Others (Market Sheds, Demo Plots, etc.) 3.5%
Adaptive Infrastructure (Guide Walls, Drainage, Culverts, Emergency Shelters, etc.) 20.5%
Plantation 5%
Water Supply (RWHS, Integrated Water Plants, etc.) 41%
Agriculture & Irrigation 20.5%
Fisheries (Smart Boats, etc.) 6.5%
Health & Sanitation 3%

This year, LoGIC has focused on developing and expanding the knowledge and capacity of local governments and households to implement nature-based solutions which have the potential to simultaneously address societal challenges, including climate change mitigation and adaptation, natural disasters, human health, food and water security, as well as biodiversity loss. To design and implement PBCRG schemes that provide nature-based solutions, LoGIC has entered a partnership with the Bangladesh University of Engineering Technology (BUET) and Center for Natural Resources Studies (CNRS).

To support vulnerable households in adapting to climate change, LoGIC has, since its inception, disbursed a total of US$ 9.72 million to 35,000 selected beneficiaries through its CRF grants. In 2021, LoGIC, through its grievance redress mechanism, selected 18,000 new beneficiaries, all of which are women-led households. The CRF enables them to implement CALOs and gain financial security despite increasingly frequent climate change-induced hazards. 74% of 17,000 beneficiary households (selected in 2019 and 2020) have gained economic benefit from the implementation of CALOs.

Addressing the barriers to women's financial inclusion is vital for closing the gender gap, empowering women both socially and financially, and in turn increasing their overall resilience. In 2021, LoGIC partnered with the NGO PCC & MEC to facilitate the inclusion of beneficiaries into the formal banking system, their access to Mobile Financial Services (MFS), as well as strengthen beneficiaries' capacity and understanding of access to financial resources, services, and markets through training. Furthermore, PCC & MEC will initiate value chain development and facilitate market linkages. With the inclusion of key financing partners such as banks and insurance companies in its model, LoGIC aims to create a conducive market-based eco-system for sustainable livelihoods by fulfilling their low-cost financing requirements. Keeping in mind the challenge of creditworthiness of the borrower/beneficiaries in the area of access to land and business viability, LoGIC is acting as the mediator in charge of facilitating financing for adaptive/resilient livelihood initiatives by connecting the credit/loan seekers to credible financial institutions. This innovative financing model also incorporates insurance facilities so that beneficiaries can avail enhanced access to climate-adaptive insurance upon climate-resilient livelihood products, thus securing entrepreneurial sustainability. In 2021, the firm facilitated the opening of 18,000 individual bank accounts for climate-vulnerable households. Notably, all beneficiaries – women who traditionally do not have access to formal bank accounts – have since the start of the project opened individual or group bank accounts, and all have made at least one bank transaction this year.

Many beneficiaries living in remote areas cannot access physical branches of banks, therefore financially excluding them. To this end, LoGIC has taken up initiatives to introduce beneficiaries to mobile wallets which enable them to carry out their banking activities digitally. However, many households do not have access to technology, such as smartphones. To counter this challenge, LoGIC has approached the private sector to procure smartphones for beneficiaries, as well as banks to provide small loans to support beneficiaries in obtaining such phones.

The saving practices of beneficaries are a major indicator of their economic empowerment. Compared to the baseline year, the savings of LoGIC households have increased from 14% to 82%, a significant achievement toward increased living standards and climate resilience. LoGIC is in the process of fostering community development through the establishment of cooperatives with legal organizational structures through which beneficiaries will deposit a certain amount of periodic savings and ensure the sustainability of their investments. Through the cooperatives, they will be able to access financial institutions such as banks and the capital market more easily, as well as run business with trade licenses, export and import with joint stock licenses, and be listed in the Bangladesh Securities and Exchange Commission by obtaining a company license.

FOSTERING GRAIN RESILIENCE IN BAGERHAT

In the Bagerhat district of south-western Bangladesh, communities are already facing the harsh realities of climate change. In the last two decades, farmers in this region have noticed a significant rise in heat waves during the summertime, increased desertification, a lack of rainfall, and severe salinity intrusion in water. This has resulted in immense socioeconomic downfalls for the farmers who can now only cultivate one type of crop per year, instead of the usual three or four. For the rest of the year, the land remains unfertile and dry, leaving farmers with minimal to no income.

"Even a few years ago I was able to cultivate three types of rice per year. I could do other seasonal vegetable cultivation as well," says Hares Akon, a farmer in the Rayenda Union. **"But now we struggle to make ends meet as crop production is very little and so is our income,"** shares Hares – a similar situation for all the other farmers residing in this area.

Hares and his family dreamed of building a strong brick house that would weather the harsh windstorms and rainfalls during natural hazards, which have been occurring increasingly often in this area. However, their unfavorable economic situation meant that the family had to continue to live in their small house made from mud and bamboo with a roof made from fragile tin, prone to destruction due to the frequent harsh weather events in Bagerhat.

"When a storm blew away our tin roof the last time, we had nowhere to go. Every time when there is a storm, I worry about whether we will survive it," says Hares' wife Minara who used to help her husband with crop cultivation and storage. She used to keep some of the produce for home and sold the rest in the market at a profitable rate. However, now there is very little crop to sell, let alone to keep at home.

When farmers like Hares raised this issue at Union Parishad meetings, LoGIC, through its PBCRG scheme, facilitated the implementation of a solar-based agricultural irrigation plant which redirects water from nearby natural canals. This water irrigation system has solar-based pumps that bring water to the surface and disperse it through valves that are distributed across the 2000-acre agricultural land. While frequent climate hazards often disrupt the electric supply in the area, the solar panels provide more consistent power for better crop cultivation. This irrigation plant offers a nature-based solution which uses clean energy and surface water and thus avoids the harmful environmental impacts of groundwater extraction.

Farmers are now able to harvest not only one but three types of crops throughout the year in this 2000-acre land. This has had tremendous socio-economic impacts on the farmers through an increase in crop diversification and higher production yields of vegetables and rice.

"Previously we could only produce around 500 kgs of rice from one cultivation per year, but now we are able to produce 1600kgs of rice from just one cultivation, while the other two cultivations gives us additional crops around the year," explains Hares, one of the 600 farmers cultivating in this plot of land.

A PBCRG of USD$21,000 was provided to the local government for the implementation of the solar-based agricultural plant. Farmers and other local governance support projects contributed around USD $11,600 through a co-financing mechanism, creating strong local ownership and ensuring long-term sustainability of the irrigation plant. LoGIC also played a catalytic role in developing a committee for the maintenance, as well as the monitoring of the optimal utilization of water from the plant. Committee members include local government representatives, community farmers, and community mobilization facilitators who meet once a month to discuss, plan, and share ideas and opportunities around the irrigation system.

"Since the installation of the solar-based agricultural water irrigation system, our economic returns have more than doubled. Like me, all the farmers have diversified their production, selling their yields in the market, and reaping profits," says Hares. He and his wife Minara have started to keep aside some of their savings every month to build a brick house to protect them from future climate hazards. Hares' family is one of many to gain climate resilience with the support of LoGIC.

EVIDENCE-BASED POLICY ADVOCACY

Over the past four years, LoGIC has gathered extensive evidence through the monitoring and review of the efficacy and sustainability of its climate adaptation activities. This forms the basis for targeted, evidence-based policy advocacy to mainstream the project's good practices into government planning and strategic decision-making processes and ensure their continuation and expansion beyond the scope of the project. As LoGIC is entering its final year, the project is also utilizing this evidence to scale up good practices, optimize its core processes, and further strengthen its climate change narrative.

In 2021, LoGIC started the development of a 'Climate Vulnerability Index' (CVI) which will strengthen local Government's capacities for accountable planning and financing of CCA and risk reduction measures and provide detailed evidence to inform advocacy on mechanisms for financing local resilience. The CVI maps the exposure (whether a district is prone to extreme weather events), sensitivity (the likelihood of an impact on the district by the weather event), and adaptive capacity (what the response or coping mechanism of the district is) of the various areas in Bangladesh down to the local government level. This helps identify vulnerabilities and plan strategies to enhance resilience and adaptive capacities by climate-proofing communities, economies, and infrastructure. With the help of the CVI, union-level administrations will be able to formulate the budgetary provision for annual development taking into account climate disaster vulnerability. On a national level, high vulnerability areas can be identified based on extensive data and evidence and be prioritized for infrastructural development, adaptation, or maintenance. Moreover, the CVI will inform policy makers and development partners and therefore contribute to the overall achievement of Agenda 2030. To formulate the Index, LoGIC has established an inter-ministerial committee to assess the field's requirements and reform the existing financing and allocation policy to be need-based.

Based on the project's experience, LoGIC has developed a Local Climate Financing Framework (LCFF) model. LoGIC has shared the framework with the Local Government Division (LGD) and has advocated for its inclusion in the revised National Climate Financing Framework (CFF).

At a national level roundtable discussion in October 2021, LoGIC presented its youth participatory advocacy initiative. The project highlighted the impacts of climate change faced by climate-vulnerable youths in Bangladesh and advocated for a more climate-vulnerable youth-friendly policy framework.

As the Government of Bangladesh is increasingly focusing on developing its tourism sector, LoGIC has been advocating for eco-tourism, which will not only sustain the environment and heritage of natural sites, but also include the diverse local climate-vulnerable communities in the sector who can benefit economically. LoGIC has created an inception report in which it has identified four districts (Khulna, Bagerhat, Sunamganj, and Kurigram) for which it is assessing potential business opportunities for eco-tourism through a community-based approach. Following this assessment, LoGIC will create business plans for the respective districts based on gathered data and stakeholder consultations.

In 2021, LoGIC also advocated with banks and other financial institutes for the financial inclusion of climate-vulnerable women. In the coming year, LoGIC will lead discussions with the Financial Institution Division (FID) to explore options for an innovative financial mechanism that will allow CRF beneficiaries to access formal bank financing after their graduation. Two other policy issues identified by LoGIC that require further attention are the implementation of (1) Parametric cyclone and risk insurance for the assets of Local Government Institutions; and (2) Risk transfer mechanism for embankments.

YOUTH AS CHANGE MAKERS

LoGIC believes Bangladesh's youth to be important agents of change that need to be empowered to ensure intergenerational change towards a climate-resilient future. Building the capacities of rural climate-vulnerable youths not only increases climate resilience within their communities, but will also enable youths to become active change-makers to help tackle long-term climate change challenges. As a result, LoGIC has developed a Youth Engagement Strategy that will supplement LoGIC's current strategy for enhancing community climate resilience by including young people as key drivers for climate action. The project will integrate youths into LoGIC supported local adaptation planning, climate risk assessments, CCA tracking and monitoring processes and therefore build their climate resilience and adaptation capabilities.

LoGIC will provide the necessary guidance and assistance for youth to increase their adaptive capabilities and climate resilience, as well as to engage in local decision-making processes and develop innovative solutions towards making real changes at the grassroot level. The project will nurture their capacities, skills, knowledge, enthusiasm and capabilities and channel them towards enhanced leadership in adaptation and mitigation challenges under the existing framework and objective of the LoGIC project. The project envisions to equip the youth with the requisite skills to deal effectively with complexities like climate change, of which they are direct victims of. Overall, LoGIC will raise awareness on climate change and environmental issues among Bangladesh's youth and create a space and platform for them to advocate and widen their networks, locally and nationally.

Thus far, LoGIC has identified 8,872 youth from vulnerable communities and project beneficiaries' families who will be part of a LoGIC Youth Network across the project's working area. In this year alone, 219 youth groups have been launched amongst across seven districts. The interconnected LoGIC youth network will build a platform for a national youth movement in Bangladesh, starting at the grassroot level. To date, a total of 132 youth from six LoGIC districts have been provided training on climate change, LoGIC interventions, as well as sheep insurance in order to engage and develop them as local insurance agents and create market linkages.

CROSS-CUTTING PRIORITIES

SOCIAL AND ENVIRONMENTAL SAFEGUARDS

Social and environmental safeguard policies are essenital mechanisms for LoGIC to prevent and mitigate undue harm to the environment and its inhabitants as a result of project activities. During project implementation, safeguards help define measures and processes to effectively manage risks and enhance the project's positive impacts. LoGIC ensures that all PBCRG schemes undergo rigorous checking using a standardized template in order to check if the proposed intervention is compliant with the social and environmental safeguards. The indicators of this checklist include, among others, compliance with human rights of the marginalized groups, gender equality, environmental sustainability, risks and threats to biological diversity, community health, security, working environment, cultural heritage, displacement and resettlement, and environmental pollution.

GENDER

Climate change is not a gender-neutral issue. Women commonly face higher risks and greater burdens from the impacts of climate change in situations of poverty and 70% of the world's poor are women. Women's unequal participation in decision-making processes and labor markets compound existing inequalities and often prevent women from fully contributing to climate-related planning, policymaking, and implementation. LoGIC's gender strategy is based on the following premises:

Vulnerability to climate change is gendered. Women are disproportionately vulnerable to natural hazards due to pervasive social norms. These norms reinforce socially acceptable gender inequality and reproductive responsibilities, which in turn, constrain women's mobility and survival options.

Adaptive capacity is gendered. Women, have less control over capitals, limited economic opportunities, and lack voice in decision-making. These factors reduce women's capacity to adapt and overcome hazards.

Vulnerabilities are intergenerational and youth are key human capital to transform for building resilience. Investing in youth is most transformational and investing in vulnerable youth, especially girls, can be extremely useful, beneficial and transformative.

Access to institutions that can help increase adaptive capacity is also gendered. Findings from studies reveal that very few women have access to public institutions. This constrains their access to adaptation information and support. The findings also reveal that by practicing gender inclusion, institutions can promote transformation of women as change agents with higher adaptive capacity.
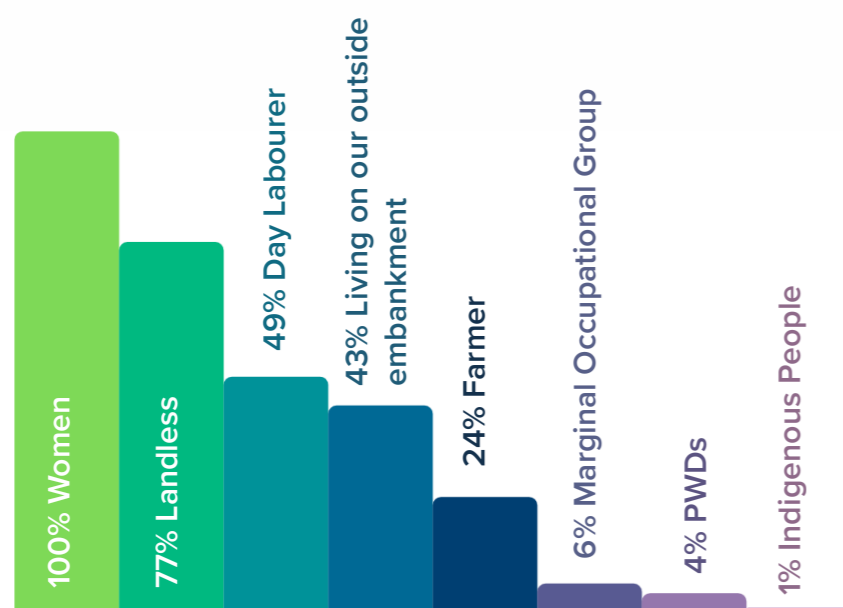
Recognizing women's important contributions as decision-makers, stakeholders, educators, carers, and experts across sectors and at all levels is crucial for achieving equitable and sustainable solutions to climate change. LoGIC recognizes the important intersection of climate change and gender. Therefore, gender has been made a cross-cutting priority in the project with relevant issues mainstreamed into the regular development planning and budgeting and by building awareness on the effect of climate change on vulnerable groups.

LoGIC's commitment to gender equality is reflected in its beneficiaries: 99% of CRF recipients are climate-vulnerable women who, through the support of the project, can take on CALOs, increasing their social and financial security, as well as their independence and agency within their communities. Moreover, 82% of PBCRG schemes implemented in 2021 were gender-responsive. Through the project, women gain access to formal financial institutions and undertake climate-adaptive livelihoods. The inclusion of women in decision-making at the local government level ensures that their voices are heard and gender concerns are considered in policies and adaptation strategies. LoGIC has a gender-sensitive M&E framework that ensures sex-disaggregated data collection.

MARGINALIZED COMMUNITIES & PERSONS WITH DISABILITY (PWDs)

LoGIC takes an equitable and inclusive approach to climate finance and adaptation by reaching out to the most vulnerable and hardest to reach communities, so nobody gets left behind. In 2021, LoGIC modified its beneficiary selection process to include the hardest-to-reach communities in the project's working areas, prioritizing women, girls, ethnic minorities, marginalized and persons with disabilities (PWDs). By adopting a human rights-based approach, LoGIC can ensure that vulnerable and marginalized people get the choice, entitlement, and participation in the entire process of building local resilience.

The following graph depicts the beneficiary distribution of the newly selected 18,000 CRF beneficiaries:

Bar chart categories: 100% Women, 77% Landless, 49% Day Labourer, 43% Living on our outside embankment, 24% Farmer, 6% Marginal Occupational Group, 4% PWDs, 1% Indigenous People

SOWING THE SEEDS OF RESILIENCE IN KHULNA

Dacope, Khulna is one of Bangladesh's most climate vulnerable regions, frequently experiencing cyclones, thunderstorms, and flooding which are destroying infrastructure and agriculture. With the majority of coastal people largely depending on natural resources for economic survival, the frequent destruction caused by climate disasters is depleting resources and livelihoods, pushing many households into even deeper poverty.

Rikta Roy, living in Dacope, had long been struggling to find a stable source of income. **"Storms, cyclones and salinity levels in water have increased over the years. This has disrupted my livelihood immensely,"** said Rikta. She started rearing chickens and ducks with high hopes of selling the poultry eggs for a profit. But the cyclone Amphan in May 2020 destroyed these hopes as it swept away her small poultry farm, Rikta's only source of income. She could not even catch fish as the ponds were too saline.

Rikta and her fellow coastal women are particularly vulnerable to the adverse impacts of climate change. The women are typically in charge of collecting water and ensuring nutrition for their families, but freshwater sources are dwindling due to increased salinity. Meanwhile, the salinity of the soil makes it difficult for them to rear animals and grow crops and vegetables. Men in the area frequently migrate away from the coastal areas, leaving women with the extra burden of sustaining their families and generating an income.

Moreover, women are often left behind in capacity-building and education activities, leaving them ill-equipped to ensure their safety during natural disasters. They are the hardest-hit demographic during cyclones and storms, falling into a vicious cycle of poverty and vulnerability aggravated by climate change.

A survey undertaken by LoGIC profiled the most climate-vulnerable women in Dacope Upazila, where Rikta and other members got enlisted. The women were divided into smaller groups where each member received a CRF of USD 340 (approximately BDT 29,000) as direct support to undertake climate adaptive livelihoods with immediate benefits for their income. LoGIC established a co-financing mechanism where these women contributed USD 58 (approx. BDT 5,000) from their personal funding to ensure strong ownership of the community and beneficiaries for sustainability. Working with local government authorities, agricultural officers, and community mobilisation facilitators, LoGIC supported these groups through every step of the implementation process -- planning, financing, climate-adaptive business model formulation, and land leasing for cultivation. The project also provided training on watermelon cultivation, created access to financial institutions, and established market linkages for these women.

"I spent my days ploughing land, watering seeds, using fertilisers and pesticides when necessary. The cultivation period lasted around three months. Finally, when the watermelons were ready, the project helped us connect with retailers for sale," said Rikta.

Between March to May 2021, LoGIC has supported over 200 women in watermelon cultivation in Dacope. The women invested $46,000 in production and gained a total profit of $90,000. This is just one of the many schemes of the LoGIC project. **"We sold watermelon at a double profit, and with these savings, we will do cultivation in the upcoming season,"** said Rikita.

LoGIC is supporting over 7,000 beneficiaries in Khulna to take their first step towards sustainable livelihoods. Coastal women are looking forward to the upcoming season to cultivate pumpkin, cucumber, corn, and sunflowers. These vegetables will not only earn them a profit but also provide nutrition for their families.

With the support of LoGIC, these women are sowing the seeds for long-term climate resilience.

CHALLENGES

1. The livelihood initiatives of CRF beneficiaries were affected differently by both climatic hazards and non-climatic hazards, such as COVID-19. As a result, 21% of beneficiaries were unable to start the next cycle of their CALO, and 21% started livelihood activities which they had to stop. This experience has made beneficiaries more cautious about updating existing business plans. LoGIC has developed a calendar for climate-adaptive livelihoods divided by districts to inform CRF recipients about which CALO is secure to take up in each season.

2. There is an occasional lack of understanding among stakeholders of the benefits of LoGIC's long-term approach when compared to traditional relief programs. Additionally, most poor beneficiaries express more interest in implementing traditional livelihood options that are not climate-adaptive but offer short-term economic return. There has been a gradual decrease of this initial apprehensiveness since the project's inception due to LoGIC's awareness-raising initiatives and the implementation of its evidence-based risk atlas in the localities.

3. Beneficiaries occasionally show an unwillingness to establish or remain in saving groups with other CRF recipients due to conflict or a preference for grouping with relatives or friends. To prevent this, LoGIC is highlighting the advantages of saving in groups, such as increased opportunities for CALO scale-up and enhanced group engagement.

4. Despite beneficiaries benefitting from PBCRG schemes, such as pure drinking water-related schemes, some beneficiaries are unwilling or unmotivated to pay a minimum fee for products or services which are necessary to maintain the facility in the long term. There is often no viable and sustainable alternative that does not require long term maintenance.

5. The sustainability of certain adaptation interventions requires continued efforts from the project which may entail some post-implementation expenditure. Post-adaptive infrastructures, for example, require operational management and maintenance work, the cost for which the communities need to bear after project completion.

6. As per administrative rules, PBCRG schemes must be completed by a certain month of the fiscal year which often does not align with the seasonal nature of the implementation and functioning of certain schemes. The Block Grants Coordination Committee (BGCC) at the Upazila level provided approval of those schemes with an adjusted timeframe.

7. The results and impacts of LoGIC depend largely on the utilization of PBCRGs by UPs and CRFs by the beneficiary households. While many of the schemes and livelihood options taken up by the local governments and households respectively are aligned with CCA, the quality and performance of them in this regard pose both risks and challenges. To this end, LoGIC has recruited an engineer to monitor the design phase of PBCRGs and ensure their efficacy and sustainability. Community Mobilization Facilitators (CMFs) are now dedicating 100% of their time to monitoring the implementation of CRFs. On top of the existing District Climate Change Coordinators (for CRFs) and the District Grants Monitors and Facilitators (for PBCRGs), LoGIC has recruited 19 additional facilitators for close monitoring at the Upazila level.

8. The influence and pressure of UP members and local elites caused limited interruptions to the beneficiary selection process. To counter this, LoGIC shared its beneficiary selection process at different levels (e.g. UPs, Upazila administration, district and community meetings) to showcase its transparency and lack of bias.

LESSONS LEARNED

1. Cultivating sunflower, maize, watermelon, and bangi (i.e., non-traditional livelihoods for communities) would be suitable options for CALOs if freshwater is managed for irrigation.

2. Risk management plans need to be developed and additional measures are required to boost or sustain livelihood activities that have been stopped or damaged due to COVID-19 related lockdowns.

3. A more in-depth understanding of livelihoods of beneficiaries will be useful for the project to support them in their immediate, intermediate, and long-term strategy for achieving climate-resilient livelihood pathways.

4. The project needs to develop effective ways to remove the practical and strategic barriers to the take up of CALOs, such as the risk of beneficiaries repurposing the CRF to respond to other challenges such as the COVID-19 pandemic, cyclone, flood, or other emergency responses. This would take away the purpose of the climate change project. Safeguarding CALOs and ensuring close monitoring may minimize the risks.

5. LoGIC needs to identify alternative ways to ensure funding necessary for the maintenance of PBCRG community schemes, such as the collection of fees once every year or season, or the linkage of the schemes with ongoing efforts of other governmental and non-governmental organizations.

6. The level of awareness of UPs on local level climate risks plays an important role in the prioritization of adaptation measures. Utilizing recently developed climate risk atlases during meetings with UP representatives has been found to help their understanding of what types of schemes are more relevant for CCA and which are purely developmental in nature. This underscores the importance of awareness-raising for formulating effective climate risk reduction action plans.

7. Planning, designing, budgeting, and implementation are important determinants of the effectiveness of adaptation measures. To this end, the project has hired project engineers for infrastructural interventions related to adaption. However, certain interventions require very specific type of technical capacities which may not be available in the project. Therefore, the project may have to enter into further partnerships and outsource technical knowledge.

MONITORING, EVALUATION & REPORTING

The LoGIC M&E system plays an essential function for project implementation and programmatic improvement, providing valuable information on program targets and periodic progress, contributing to the overall achievement of the project's goals. The main objective of LoGIC's M&E system is to facilitate the project management staff to

- Ensure operational activities are planned and implemented on time and aligned with the project's overall objective.
- Establish a learning environment, identify potential shortfalls in the expected performance, and share successes.
- Develop appropriate remedial actions.

MONITORING

In light of COVID-19 induced lockdowns wherein all physical movements of project staff had to be halted, the project initiated alternative ways to continue its monitoring activities:

1. In August 2021, LoGIC conducted its fourth round of "Kemon Achen" (How Are You?), a light touch survey on the adaptation status of climate-vulnerable communities in the context of the COVID-19 pandemic. LoGIC is a pioneer in UNDP to conduct such a survey of beneficiaries within the context of COVID-19. The project staff conducted telephonic interviews with 426 beneficiaries of LoGIC to understand the immediate impacts of the pandemic on the physical and mental health, livelihoods, and education of the project beneficiaries. The information collected from the interview was documented online using a data screen and aided project monitoring and follow-up.

2. Field staff were guided over the phone, texts, and online meetings to better understand data collection. LoGIC provided front-line staff with tablet phones for data collection, including photographs. These helped the project to continue its monitoring of regular project activities during the COVID-19 pandemic.

3. LoGIC used a virtual monitoring system i.e., video calling, to monitor community level activities. The gathered information was shared in virtual meetings attended by project stakeholders such as DDLG, UNO, Chairman, UP Secretary and LoGIC-PMU.

4. LoGIC had planned a EU mission to project sites in Khulna in January 2022 which had to be cancelled due to concerns related to COVID-19.

4. The project has created and maintained its Management Information System (MIS) and monitoring databases to capture and track beneficiary, household, Union Parishad and intervention level data necessary to calculate values for all indicators tracked quarterly and annually. The data captured in the databases was used to analyse project outputs and outcomes across geographic locations and findings were shared with project management on a quarterly basis.

5. The Adaptation Tracking and Measuring (ATM) system is used to measure and monitor the climate adaptation and resilience progress of households and communities receiving support from the project. On a monthly basis, the ATM collects data from project supported households against the set adaptation indicators. The data is used to prepare quarterly adaptation monitoring reports.

6. The project management has agreed on set standards for all project interventions. The LoGIC M&E system has prepared five process monitoring tools based on these set standards and conducted regular monitoring of sample interventions using the tools. The project monitoring team prepared quarterly monitoring reports which were shared with management.

EVALUATION

- **Mid-term Evaluation (MTE):** The Mid-Term Evaluation (MTE) aims to assess the relevance of the project objectives, as well as the efficiency, effectiveness, and sustainability of the project. The Evaluation is undertaken in accordance with guidance from United Nations Evaluation Group (UNEG). The international research firm "IPA Global" has been hired to conduct the MTE of LoGIC. However, the start of the MTE was delayed due to COVID-19 related travel restrictions, which hindered the international evaluator from entering the country. The MTE has since commenced and the collection of field-level data has been completed. Due to COVID-19, the deadlines of the deliverables have been rescheduled and the final MTE report will available by March 2022.

- **Annual Progress Review (APR):** To assess LoGIC's progress and capture its challenges and lessons learned, an Annual Progress Review (APR) has been conducted by the renowned national-level research organization 'Unnayan Shamannay'. The APR will complement the final project evaluation and will inform the project management and project steering committee.

REPORTING

To document the project's progress and challenges, as well as showcase LoGIC's achievements, the following reporting documents were drafted in 2021:

- Quarterly Progress Reports
- Quarterly MIS Reports
- Quarterly Monitoring Reports
- MPTF Report (for SIDA)
- Six-Monthly report (for Local Government Division, GOB)
- Annual Progress Report 2021 (for EU)

COMMUNICATION & VISIBILITY

This year, LoGIC launched the Extension Phase of the Project via ZOOM, in the presence of Honourable Minister, Md. Tazul Islam, Ms. Rensje Teerink, Former Ambassador and Head of Delegation of the European Union to Bangladesh, Ms. Christine Johansson, Deputy Head of Mission, Embassy of Sweden to Bangladesh, Mr. Helal Uddin Ahmed, Senior Secretary, Local Government Division, Ms. Saila Farzana, Joint Secretary, LGD & National Project Director, LoGIC Project, Ms. Van Nguyen, Deputy Resident Representative, UNDP Bangladesh and many other national and local level dignitaries. Mr. Tazul Islam remarked, **"The LoGIC project has proven to be a good system to deliver climate finance through local government institutions, directly reaching climate-vulnerable people to invest on local adaptation."** Alongside the Government, he also thanked the project's development partners for supporting the most climate-vulnerable people of Bangladesh. Former Ambassador Rensje Teerink highlighted the EU's decade long support to Bangladesh in combating climate change.

In March 2021, Mr Per Olsson-Fridh, Sweden's Minister for International Development Cooperation visited LoGIC's project sites in the coastal belt of Bangladesh, accompanied by Her Excellency Alexandra Berg von Linde, Swedish Ambassador to Bangladesh, Sudipto Mukerjee, Resident Representative of UNDP Bangladesh, Joint Secretary of Local Government Division, Saila Farzana, and Jesmul Hasan, Country Focal Point of UNCDF along with many other delegates. **The Minister expressed his satisfaction after seeing how Sweden's support is being used for climate change adaptation in Bangladesh.**

Another notable visitor to the project site this year was His Excellency, Mr Espen Rikter-Svendsen, the Ambassador of Norway to Bangladesh. He also visited the LoGIC projects in Dacope, Khulna, which he described as eye-opening in terms of the volume of activities and complexities associated with climate change adaptation efforts in Bangladesh. He also emphasized the improvements of the livelihoods of the people in the most climate-vulnerable regions and appreciated the understanding amongst the local Government and all other relevant stakeholders.

Throughout 2021, LoGIC established widespread communication and visibility of the project and its development partners and all relevant stakeholders at the district and national level.

During the climate hazards of Cyclone Yaas and floods in the project areas, LoGIC ensured strong messaging on resilience building and climate change adaptation to its project communities and households. LoGIC distributed branded vests to all 18,000 newly selected CRF beneficiaries and project staff were provided with branded umbrellas and caps during the monsoon season.

In 2021, LoGIC continued to regularly update its social media platforms to communicate the activities and results of the project to its followers.

On Bangladesh's most popular social media platform, Facebook, LoGIC's page reached 315,956 audience members and engaged them in discussions on climate change. LoGIC has also established a strong presence on Twitter, with daily updates on climate change issues, project outcomes, and the project's approach to working towards sustainable solutions

LoGIC organized 16 episodes of broadcasting to raise awareness on climate change and climate-adaptive livelihoods through community radio programs across four districts. Local celebrities, the Deputy Director of the Local Government, Upazila line department officials, journalists, CRF Partners, and youth representatives attended the on-aired programs. Each radio station produced and broadcasted four episodes weekly, which were also re-broadcasted. The discussions highlighted the success stories of beneficiaries and successes of beneficiaries in local-led climate-adaptive livelihoods, bank transfers, and developing unified business plans for building climate resilience. The discussions also profiled climate change issues in the area and disseminated information on the climate change context of each region. Profiling LoGIC's activities and the issue of climate change through community radio facilitated the climate change discourse in the area and increased the visibility and interest of other stakeholders in discussions of advocacy and planning for climate change.

through innovative techniques. LoGIC's website (https://logicbd.org) is regularly updated and is a knowledge hub for national and international climate action. To ensure widespread visibility of project activities, key events, and successes at the district and national level, LoGIC has been featured in local and national media, including TV news, radio channels, and other offline and online media.

Quarterly newsletters/E-bulletins have been disseminated to all stakeholders at district and national levels, providing information on the project's significant highlights, events, achievements, learnings, media visibility, visits from local government representatives, and inaugurations of schemes. Additionally, blogs, human interest stories, and write-ups have contributed to highlighting the project's progress and achievements.

In the context of COVID-19, the project raised awareness on social distancing and hygiene measures to all beneficiaries, project staff and relevant stakeholders of the local government institutions.

PARTNERSHIPS

Establishing partnerships is an important way to enhance the effectiveness of resilience-building efforts as it offers the opportunity of complementing existing knowledge, skills, capacities, and resources.

PARTNERSHIP WITH BRAC FOR CALO TRAINING

To ensure capacity building on climate-resilient means of livelihoods for CRF beneficiaries and create linkages with private sector actors for scalable business opportunities, a partnership between LoGIC and BRAC has been established. This is a 12-month partnership to provide training on the most feasible adaptive and economically feasible livelihood options to 63,000 CRF beneficiaries. BRAC has developed 17 training modules on CALOs, which support scalable business opportunities.

PARTNERSHIP WITH THE BANGLADESH UNIVERSITY OF ENGINEERING TECHNOLOGY (BUET) AND THE CENTER FOR NATURAL RESOURCES STUDIES (CNRS)

LoGIC entered into partnerships with the Bangladesh University of Engineering Technology (BUET) and the Center for Natural Resources Studies (CNRS) to design and implement PBCRG schemes that provide nature-based solutions to climate change-induced hazards. The project has partnered up with BUET to transfer its technology of reducing soil erosion using vetiver grass to the Local Government. Professor Dr. Mohammad Shariful Islam, Department of Civil Engineering, BUET is providing necessary technical support to LoGIC to demonstrate vetiver-based slope protection in Pankhali Union, Thanahat Union, and Rajibpur Union.

On the other hand, CNRS is working closely with the UPs of Koyra Sadar, Moharajpur and Dakkhin Bedkashi for mangrove plantation and with the UPs of Uttar Sreepur and Dakkhin Sreepur for swamp afforestation. Mangroves act as natural barriers to prevent the damage of cyclones and tidal surges, and swamp forest protects human settlements from erosion following floods and flash floods.

These partnerships will act as key driving forces for the successful implementation of the aforementioned nature-based solutions.

Partnership with THE POPULATION CRISIS CONTROL AND MASS EDUCATION COMMITTEE (PCC & MEC)

Financial inclusion of the most climate-vulnerable people, especially women, is one of the key priorities of the new strategy for low-carbon, climate-resilient, and pro-vulnerable development. LoGIC has established a partnership with the Population Crisis Control and Mass Education Committee (PCC & MEC) to develop market linkages and financial inclusion for the most climate-vulnerable households of CRF beneficiaries. The organization is providing support to facilitate the opening of individual and group bank accounts of the newly selected 18,000 CRF beneficiaries and strengthening the 35,000 beneficiaries' capacity and understanding of, as well as access to, financial resources, services, and markets. Furthermore, the partnership is establishing market linkages and value chains for LoGIC's 1990 beneficiary groups to support their climate-adaptive businesses.

WAYS FORWARD

As LoGIC is concluding its fifth year and entering its final year, the project is scaling up its best practices and optimizing its core processes to further strengthen its local financing model and deliver climate finance to the most vulnerable people with lower transaction costs and higher adaptation benefits. The following areas of focus will inform the final project year in 2022:

CAPACITY BUILDING

In 2022, LoGIC will train 45,000 CRF recipients on CALOs and ensure the financial inclusion of all beneficiaries. By building cooperatives with legal organizational structures, conducting workshops, and establishing market linkages, LoGIC will enable beneficiaries to make period group savings and create group businesses. LoGIC's youth strategy will ensure that youth are included in climate adaptation strategies and therefore achieve lasting change for intergenerational climate resilience.

CLIMATE FINANCE

Ensuring access to climate finance is a key component of the LoGIC model. In 2021, LoGIC partnered with PCC & MEC to facilitate the financial inclusion of its beneficiaries. In 2022, LoGIC, through PCC & MEC, will facilitate the opening of 2,000 group bank accounts, as well as provide training to all 45,000 LoGIC beneficiaries on financial literacy. Moreover, LoGIC will establish market linkages and facilitate contract farming for the 2000 beneficiary groups to ensure the sustainability of their CALOs.
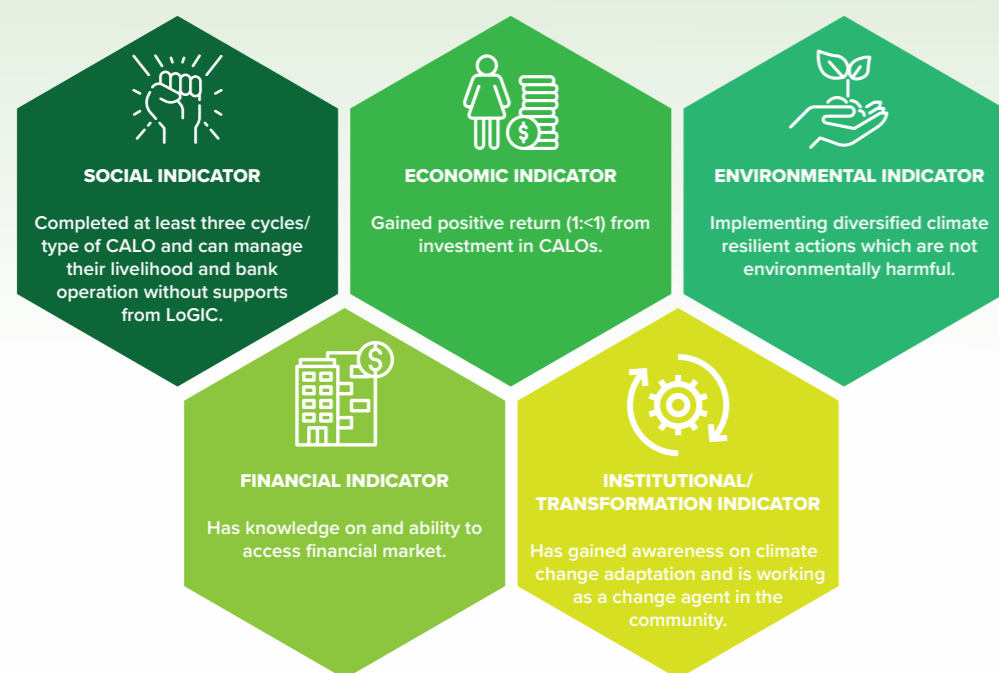
POLICY ADVOCACY

Achieving policy-level change is crucial for long-term change. Consequently, strengthening policy advocacy is a key priority for LoGIC as it is entering its final year. LoGIC will continue to implement a top-down approach in order to sensitize local government officials on the necessity for climate change adaptation. To this end, the project will chair various meetings and round table discussions on climate change adaptation and climate financing with the Government, civil society organizations, and other relevant stakeholders. When relevant, LoGIC will use its available budget to to hire consultants for specific policy advocacy issues.

PROJECT SUSTAINABILITY & EXIT PLAN

As LoGIC is entering its final year, the project has started the development of an exit strategy and sustainability plan. Thus far, LoGIC has initiated 24 consultations with CRF partners, youths, local governments, media, and Community Mobilization Facilitators (CMF) across five districts. CRF beneficiaries who have completed at least three cycles/types of climate adaptive livelihood options (CALO) will be graduated from LoGIC support. According to the project's database, there are currently 7,870 CRF beneficiaries who have completed at least three cycles/types of CALO. LoGIC has defined five indicators to assess the capacity of beneficiaries to graduate in the first quarter of next year:

SOCIAL INDICATOR

Completed at least three cycles/ type of CALO and can manage their livelihood and bank operation without supports from LoGIC.

ECONOMIC INDICATOR

Gained positive return (1:<1) from investment in CALOs.

ENVIRONMENTAL INDICATOR

Implementing diversified climate resilient actions which are not environmentally harmful.

FINANCIAL INDICATOR

Has knowledge on and ability to access financial market.

INSTITUTIONAL/ TRANSFORMATION INDICATOR

Has gained awareness on climate change adaptation and is working as a change agent in the community.

To sustain the results of PBCRG investment as well as the adaptation planning and financing practices mainstreamed into local government processes, the LoGIC project has adopted the following exit strategies:

- Update the Union level RRAPs for the next couple of years with the participation of UPs and raise their awareness on adherence to the RRAPs during five-yearly and annual planning.
- Form management committees with the participation of UP representatives, members of beneficiary communities, and other local-level stakeholders to ensure post-implementation management of PBCRG schemes.
- Equip management committee members or other stakeholders with the capacity and skills necessary for post-implementation.
- Establish a 'user fee' mechanism to raise funds for post-implementation operations and maintenance work.
- Sign agreement document among the concerned parties to ensure post-implementation management.
- Link PBCRG schemes with relevant ongoing efforts of other governmental and non-governmental organizations and agencies.

The finalized exit strategy and sustainability plan will inform the remaining project period. To ensure the sustainability of LoGIC's adaptation strategy, the Government, UNDP, and UNCDF will work together and explore ways to arrange funding for a broader scale-up of LoGIC from the Government of Bangladesh.

ROADMAP FOR LoGIC SCALE-UP

PHASE 1: APRIL 2022 - FEBRUARY 2023

In this scale-up phase, LoGIC will be working in six newly selected climate-vulnerable districts (in addition to the existing seven districts): Sandip, Cox's Bazar, Noakhali, Satkhira, Gaibandha, and Chapainawabganj, as well as three climate-vulnerable districts of the Chittagong Hill Tracts. All districts have been identified based on the *Bangladesh Climate and Disaster Risk Atlas: Exposures, Vulnerabilities, and Risks* report published by the Asian Development Bank. Specific local government units will be identified by LoGIC's ongoing nationwide CVI. Overall, LoGIC will scale up its model in the 16 most climate-vulnerable districts and three districts from the Chittagong Hill Tracts (Total 19).

EU	UNDP-UNCDF	LGD	Embassy of Sweden	Timeline
Developing action fiche	Developing project document	Developing DPP	Developing concept note	April-May 2022
EU signing Financing Agreement with ERD	Placing to ERD	Placing to Planning Commission	Sharing with MPTF	June-December 2022
EU signing Contribution Agreements with UNDP and UNCDF	Signing with ERD	Placing to ERD	Signing MPTF agreement	January-February 2023
LoGIC II is proposed to start on 1 March 2023 with support from the Local Government Division, EU, the Embassy of Sweden, UNDP and UNCDF.				

PHASE 2: NATIONWIDE SCALE-UP OF LoGIC MODEL

LoGIC has been included in the GCF's Country Programme for Bangladesh as agreed with the Government of Bangladesh and has been recognized as a sustainable adaptation model to support local government institutions to effectively and efficiently deliver CCA actions at different levels. Country Programmes are the cornerstone of each country's pipeline development with GCF and are the first stage of the updated GCF project and programme cycle, forming the basis for prioritizing the further development of funding proposals for projects and programmes submitted by Accredited Entities on behalf of countries for funding.

Potential GCF financing would entail a primary co-financing commitment of the Local Government Division of $75 million with GCF's expected contribution totaling around $100 million ($25 million as a grant, $25 million as guarantees, and $50 million as a reimbursable grant). UNDP is notably eligible to act as an accredited entity to GCF for using grants, guarantees, and reimbursable grants. However, the process from proposal submission to signing of agreements is time-consuming and complicated. Following is a roadmap for GCF proposal submission. Each activity mentioned in the table has a number of sub-activities. Timelines are very tentative as those are subjective to GCF's consideration. A conservative estimate suggests that it will take at least 15-16 months to complete the process from beginning to end.

Activity	Actors	Timeline
Concept note submission	UNDP, LGD, ERD	December 2022
Feedback and recommendations and finalization of the concept note	UNDP, ERD, GCF Secretariat	February 2023
Project Document (GCF's Funding Proposal) preparation; Feasibility Study; Stakeholders' Consultation; Validation; Finalization	UNDP, ERD	March – August 2023
Funding Proposal submitted to NDA Bangladesh	ERD	September 2023
Stakeholders' Consultation - Second		September 2023
Obtaining No Objection Letter from NDA		September 2023
Funding proposal submission to the Secretariat	UNDP, GCF Secretariat	September 2023
Analysis and Feedback and Assessment recommendation to the Board	GCF Secretariat	October – December 2023
Independent Assessment (done by Independent Technical Assessment Panel)	GCF's Technical Advisory Panel,	January 2024
Submission of documentation to the Board	GCF Secretariat	February 2024
Board decision	Board	February/March 2024
Post approval follow-up	GCF Secretariat	February/March 2024
Implementation of Board conditions	GCF Secretariat	February/March 2024
Funded activity agreement	GCF Secretariat, UNDP	March 2024
Letter of commitment	Interim Trustee	March 2024
Funding proposal conditions	GCF Secretariat, UNDP, Board	March 2024

ANNEXES

RESULT/OUTPUT	ESTIMATED BUDGET (USD)			PROVISIONAL EXPENDITURE (USD)		
	UNDP	UNCDF	TOTAL	UNDP	UNCDF	TOTAL
Strengthened capacity of local governments, households and other local stakeholders to develop local plans that integrate CCA-DRR solutions	290,415	113,185	403,600	246,678	93,392	340,070
Established financing mechanism to fund local governments and communities for implementing climate change adaptation measures	4,918,197	3,549,004	8,467,201	5,126,833	3,601,445	8,728,278
Experience and evidence inform and contribute to further improvements in policies and practices for UPs and national systems in relation to CCA	367,063	171,070	538,133	147,675	135,146	282,821
TOTAL USD	5,575,675	3,833,259	9,408,934	5,521,186	3,829,983	9,351,169

ANNEX II - PROGRESS OF THE ACTION DURING THE REPORTING PERIOD

RESULT 1: Strengthened capacity of local governments, households and other local stakeholders to develop local plans that integrate climate change adaptation measures and disaster risk management.

Result 1 focuses on the capacity development of the government, CSOs, local institutions, local stakeholders and community members around climate change, and provides opportunities for climate change adaptation to be integrated into local plans through the activities under this component. The activities are developed through a participatory manner through Community Risk Assessments (CRA), which in turn informs the development of local Risk Reduction Action Plans (RRAP). This plan will subsequently be integrated into the local development planning process and be screened against current and emerging environment and climate and disaster risk priorities, to improve the climate-inclusive Local Development Plans on an ongoing basis.

ACTIVITY PROGRESS

In 2021, 74 new wards from 55 UPs were selected based on field demand, climate science data and advance information from secondary sources to provide Community Resilience Funds (CRF) to an additional 18,000 new beneficiaries. Trainings on the new beneficiary selection methodology and Ward Census were organized for 125 community volunteers and 14 project staff. A total of 42,492 households were surveyed in 74 Wards in 55 Unions for selecting the third-round project partners (CRF grant beneficiaries). Through a grievance redress mechanism, a total 18,000 CRF Partners were finally selected and endorsed by respective UP Chairmen, Upazila Nirbahi Officers and DDLGs. 100% of the selected new CRF beneficiaries are women. LoGIC's climate change adaptation initiatives such as grants support and training on CALOs promoted a human rights-based approach to climate change adaptation with special emphasis on women, girls and indigenous people. In the reporting period, 6000 CRF beneficiaries were trained on CALO. A total of 132 youth from six LoGIC Districts were provided training on climate change, LoGIC interventions, and sheep insurance to engage and develop them as local insurance agents and creating market linkages. LoGIC designed and introduced Climate Adaptive Insurance Coverage (Sheep Insurance) to improve the resilience and safeguarding of vulnerable women who own livestock.

A ToT on the process of Social Audit was organized via ZOOM for three districts. The training was attended by 30 project district level staff, as well as community and CSO representatives. It was a tw-day long event and followed by four days of PBCRG scheme visits. After the ToT, trainings on Social Audit were organized in four Unions for 100 UP members, community and CSO representatives. A total of 20 external auditors and seven project staff were trained on UP performance audit. An annual performance audit of FY2019-20 was completed for all the 72 UPs. A UP audit report was prepared and based on the report, the PBCRG funds were transferred to all 72 UPs.

To strengthen Climate Change Attribution through risk updating, risk prioritizing and climate modeling, LoGIC prepared Risk Atlas for seven district, 18 Upazilas and 72 Unions of the working areas to help Union Parishads and community people understand the nature of climate change, forecast future situations, and alert about the possible climate change risks.vIn 2021, 24 UPs updated their risk reduction action plans (RRAP) which were also integrated in the 5-year plans of the UPs.

LoGIC strengthened networks and linkages between CRF beneficiaries and govt. line department officials at the Upazila level by organizing 18 meetings. As a result, 17,000 CRF beneficiaries received technical knowledge and input supports such as seeds, fertilizers, pesticides, and vermi-compost instruments.

Project staff facilitated orientation sessions on business plans for 923 new CRF beneficiary groups. According to the business plans, the CRF beneficiaries selected diversified livelihood options in Khulna, Bagerhat, Barguna, Patuakhali, Sunamganj and Kurigram.

As a part of the COVID-19 awareness campaign, awareness raising messages were broadcasted over microphones in the climate hotspots in the seven districts of LoGIC. Moreover, 18 important messages on COVID-19 were disseminated to the local communities through LoGIC banners. The Community Mobilization Facilitators (CMF) of LoGIC discussed about the COVID-19 govt. guidelines, heath safeties, personal hygiene practices in 1067 CRF beneficiary groups. The CMFs were provided with masks and hand sanitizer to maintain personal hygiene during group meetings. Cash support of Tk.2000 each was provided to 2054 CRF beneficiaries of the LoGIC project in Khulna and Bagerhat District.

LoGIC organized 16 episodes of Community Radio Program broadcasting on climate change awareness and climate adaptive livelihood through community radio program in four Districts. Local celebrities, DDLG of LGD, Upazila line department officials, journalist, CRF Partners, youth representatives and local resource persons attended the on-aired programs. The episodes were also re-broadcasted. Each radio station produced and broadcasted four episodes weekly. LoGIC maintained its strong presence on Twitter.. The Twitter posts were updated to highlight climate change issues, project outcomes, and the project's approach to working towards sustainable solutions through innovative techniques and CRF and PBCRG grants.

LoGIC is promoting the use of digital online-based technology as an alternative training method and completed 20 e-modules on CALO to fulfill the targets set for the training as the physical gathering of training participants was often not possible due to thepandemic.

LoGIC observed International Women's Day through social media, reaching over 100,000 audience members.

Indicator (1): % of women, poor and marginalized people that participate in the formulation of climate risk integrated LDPs
Baseline: 1.3% (Reference: LoGIC Baseline Study 2018)
Target: 52% (Project Total)

PROGRESS

100% of the newly selected 18,000 CRF beneficiaries (100% women, 6% representative of marginal occupational group, 4% Persons with Disability-PWD representatives and 1% indigenous people, 24% farmer, 4% fisherfolk, 49% day labor, 9% women headed, 77% landless (Agricultural), 43% living on or outside embankment) participated in the household risk reduction action plan (HH-RRAP) developing process. LoGIC followed a unique and comprehensive beneficiary selection process.

The following criteria were used to correct those error for inclusion and promote greater harmony in the community:

- Omitting error- The eligible beneficiaries who were left out in 1st and 2nd round due to not having a National Identity (NID) card.
- Proximity error- The eligible beneficiaries who are living closest to the existing CRF group and were left out from the 1st and 2nd round due to a lack of data.
- Revisiting waiting list with existing CRF groups.

LoGIC also supported the 72 UPs to organize 96% Wardshava (i.e., community level meetings chaired by elected UP members) to update climate risk informed annual local development plans (LDP) and Risk Reduction Action Plans (RRAP).

ANALYSIS

LoGIC completed the selection of 18,000 CRF beneficiaries in 2021 and the beneficiaries formed 932 groups to implement CALOs. All the CRF groups developed their business plan (climate risk integrated local development plan) to implement CALO, accompanied by orientation sessions on business plans facilitated by project staff . According to the business plan, it was found that CRF beneficiaries selected diversified options in six Districts.

% Beneficiaries

Data shows that 46% of the CRF beneficiaries are already experienced in implementing three types of CALO and 80% have implemented two types of CALO. 100% of the beneficiaries have completed at least one type of CALO. The chart also depicts that 74% of beneficiaries have gained positive economic benefit (1:<1) and 54% of the beneficiaries started savings in group and also deposited their money to their group accounts.

KEY LESSONS

Due to the COVID-19 pandemic and the countrywide lockdown, 21% of beneficiaries were not able to start the next cycle of their CRF livelihood. CRF livelihood activities started but had to be stopped for 21% beneficiaries. The CRF livelihood of 58% beneficiaries has not been affected. COVID-19 related lockdowns prevented field staff from visiting project sites, leading to a decrease in monitoring activities and necessitating remote planning. Government restrictions on meetings and assemblies halted field-level consultations and meetings. Moreover, several project staff fell ill due to COVID-19, slowing down the overall implementation of project activities.

No. of Beneficiaries who Lost Livelihood due to Yaas
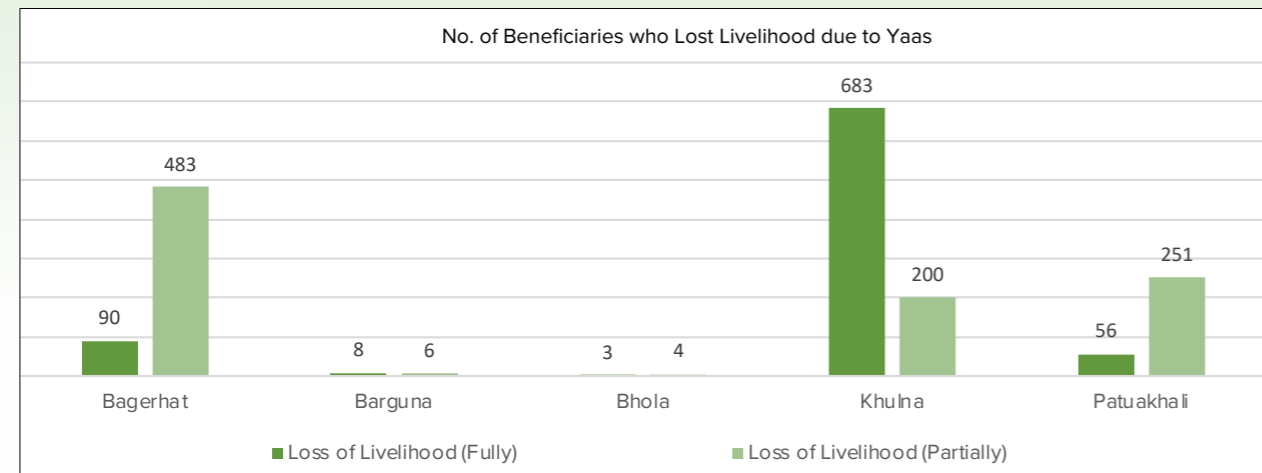
A more in-depth understanding on livelihoods of beneficiaries will be useful for the project to support their immediate, intermediate, and long-term strategy to achieving climate resilience. The project should look into the reluctancy to transition to adaptive livelihoods and develop effective ways to remove practical and strategic barriers.

PLANS FOR 2022

- Training on CALO for 45,000 CRF beneficiaries
- Capacity building of 17,000 CRF beneficiaries on financial inclusion services
- Establishing local market linkages of CALOs implemented by CRF beneficiaries
- Youth engagement and awareness raising in project areas
- Training on climate change for youth groups
- Cross learning visits (within district) for the 1990 CRF beneficiary groups
- Development and dissemination of information and communication materials

Indicator (2): % of target UPs that integrate CCA solutions into LDPs to support the most vulnerable households.
*Baseline:* 31.9% (Reference: LoGIC Baseline Study 2018)
Target: 90% (Project Total)
Progress: 100% of targeted 72 UPs integrated climate change adaptation (CCA) solutions into the local development plans (LDP).

ANALYSIS

In 2021, CCA actions were integrated and streamlined through UP schemes. This year, 72 UPs planned 863 CCA-linked schemes, out of which LoGIC supported only 200 schemes through PBCRG. UPs mobilized 23% of funds from other sources to implement their CCA-linked schemes. This indicates that UPs are more aware and educated about issues relating to climate change.

Integration of CCA in UP Planning
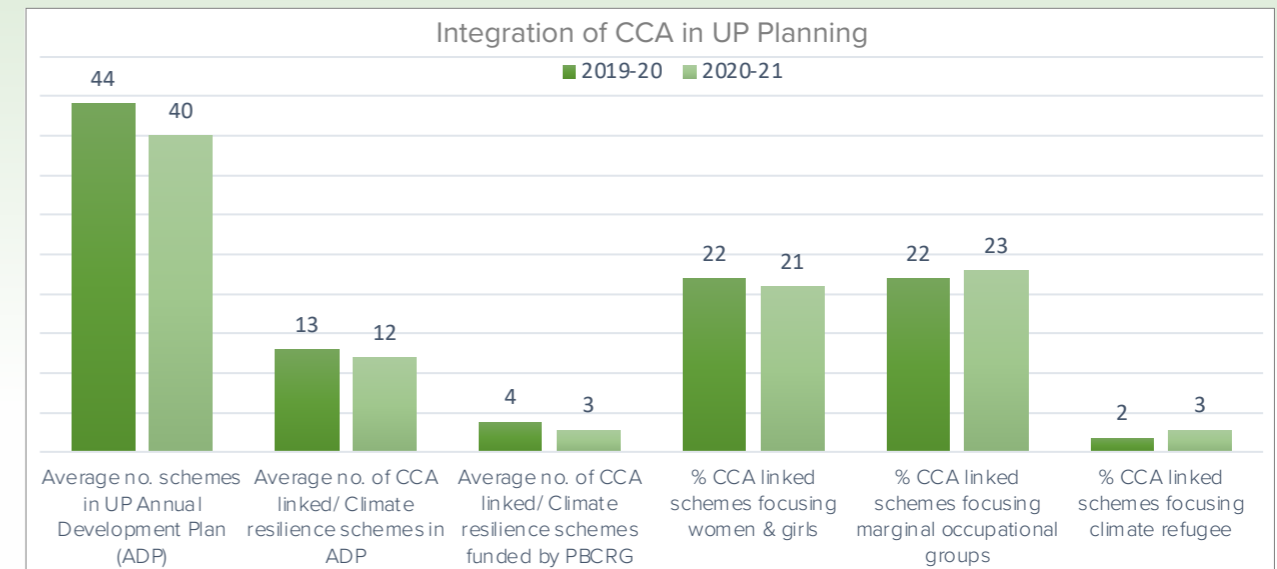
Data shows that UPs, on average, planned 40 schemes in 2020-21, of which 12% are related to CCA. 21% of the planned CCA linked schemes are focusing on the needs of women and girls and 23% schemes on the needs of marginal occupational groups. The number of schemes has been reduced but the budget has increased. The PBCRG scheme on saline tolerant agricultural demonstration plots inspired around 1200 households to do fruit garden farming in their households to meet their daily micro and macro nutrient supplies.

In 2021, the UPs planned a total of 200 CCA linked schemes with PBCRG support. The following pie chart illustrates that 41% schemes are focusing on Agriculture and Irrigation, 13% on Fisheries, 6% on Health & Sanitation, 82% on Safe Water Supply, 10% on Plantation, 41% on Adaptive Infrastructure and 7% on Others (Market shed, Demo plot etc.). The schemes will benefit about 331,595 community members of which 55% are women. The budget of the CCA linked schemes were not larger and averaged at BDT 7.66 lac [USD 9,020] each.
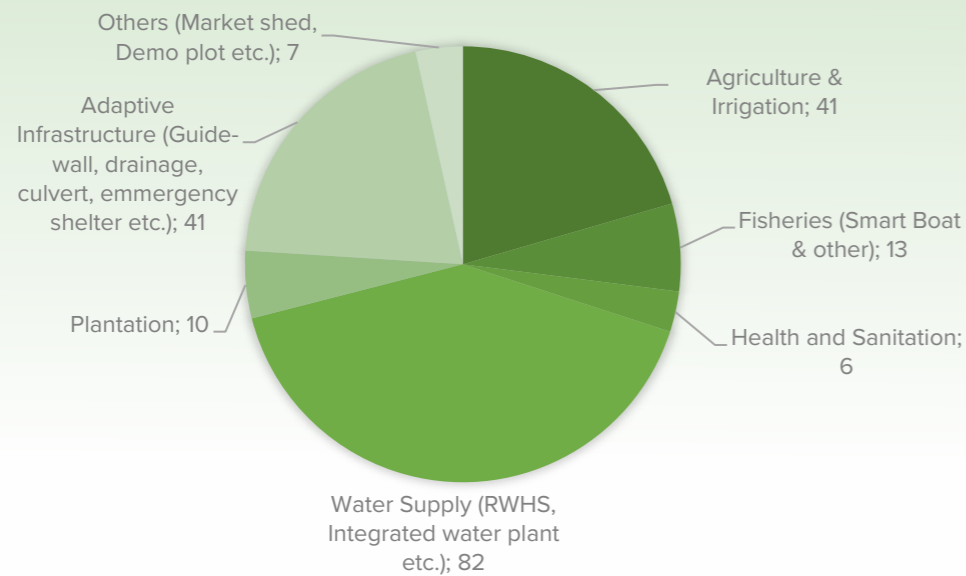
KEY LESSONS

In 2021, infrastructures related schemes were planned less frequently. The number of climate resilient water supply system schemes has been doubled. The sustainability of schemes have been strengthened through certain measures, including the formation of management committees with the participation of UPs, beneficiaries and other stakeholders, the signing of necessary agreements among the involved parties, and the introduction of a user fee to generate necessary funds for repair and maintenance. Some new initiatives such as adaptation and mitigation in agriculture, providing safety equipment to fishermen to reduce risk on their life, promoting surface water irrigation, and mangrove, swamp and vetiver plantation were undertaken. A partnership with BUET and CNRS (NGO) has been signed to implement nature-based solutions. Better climate justifications of the selected schemes and selected sites, as well as climate risk maps have been used for many of the schemes and locations.

PLANS FOR 2022

- Training for 52 UPs, govt. officials, CSO and local institutions on the process of climate risk informed LDP and RRAP development/update process
- Training of 72 UPs to monitor expenditure and implementation of CCA schemes as part of fiduciary risk management
- Training of 72 UPs on the process of social audit

RESULT 2: Established financing mechanism to fund local governments and communities for implementing climate change adaptation measures.

By strengthening capacity and implementing the climate-inclusive Local Development Plans, the project will establish two types of complementary grant financing at the Union level: 1) Performance-Based Climate Grant (PBCRG) and 2) household level Community Resilience Fund (CRF). PBCRG will allocate additional resources to complement existing LGI budget with the specific purpose of strengthening resilience around climate and disaster impacts on development investment (i.e., infrastructure and public services for the poor). CRF will channel grants directly to the households vulnerable to impacts of climate change ensued disasters.

ACTIVITY PROGRESS

LoGIC contributed to creating the pathway to increase climate resilience for 35,000 of the most vulnerable households in 72 UPs, of which 99% are women. With LoGIC's support, these beneficiaries formed 1990 groups and implemented 23 types of climate adaptive livelihood options to reduce their climate change vulnerabilities and increase incomes.

LoGIC facilitated a group approach to CALO implementation. The newly selected CRF beneficiaries formed 923 groups in the reporting period. 259 CRF beneficiaries in Kurigram, Khulna and Bagerhat have turned their climate adaptive livelihood (CALO) into businesses. The beneficiaries are now confident to run their livelihood independently.
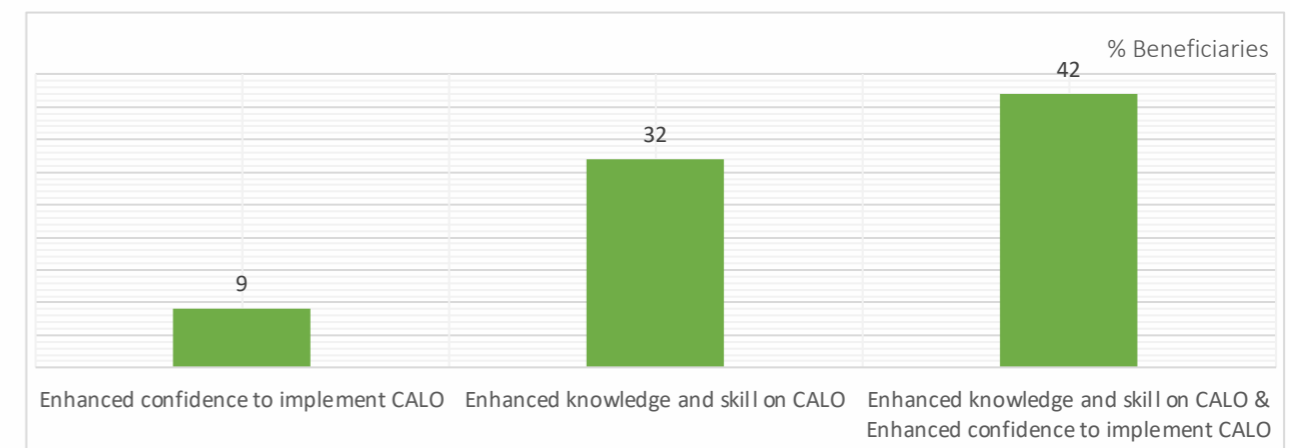
42% of 17000 beneficaries reported that they have gained knowledge and skills along with a boost in confidence to implement CALO. Beneficiaries confirmed to have gained a broader skill set to implement CALO. Among them, the diversification of existing agricultural knowledge and scientific methods and techniques to rear domestic animals/birds are manifest in all districts except for Bhola. Patuakhali, Khulna and Barguna adapted pisciculture.

LoGIC enhanced the financial inclusion of 18,000 of the most vulnerable women, who had no previous experience of owning a bank account. The women CRF beneficiaries are now maintaining individual bank accounts.

200 PBCRG funded climate change adaptation linked schemes were selected for the FY 2020-2021 through discussion with community, UPs and DDLGs.

During the heatwave, diarrhea was common in many LoGIC districts (Bagerhat, Barguna, Patuakhali) due to the shortages of safe drinking water. The PBCRG funded water supply systems performed amazingly to supply safe water to the communities and meet their daily needs.

Indicator (1): % of 35,000 vulnerable households (women, poor and marginalized) who benefit from CCA finance

Baseline: 10% (National)

Target: 60% (Project Total)

Progress: 59% people (78% women) of the working areas benefit from LoGIC interventions

PROGRESS

A total 35,000 beneficiaries received trainings on CALOs, alongside a CRF grant, and have already started their new ventures or farming. 100% of beneficiaries have initiated at least one type of CALOs, while 78% have initiated two types, 43% have initiated three types, and two percent have initiated four types of CALOs.

Cumulative Number of CALOs Initiated by CRF Beneficaries
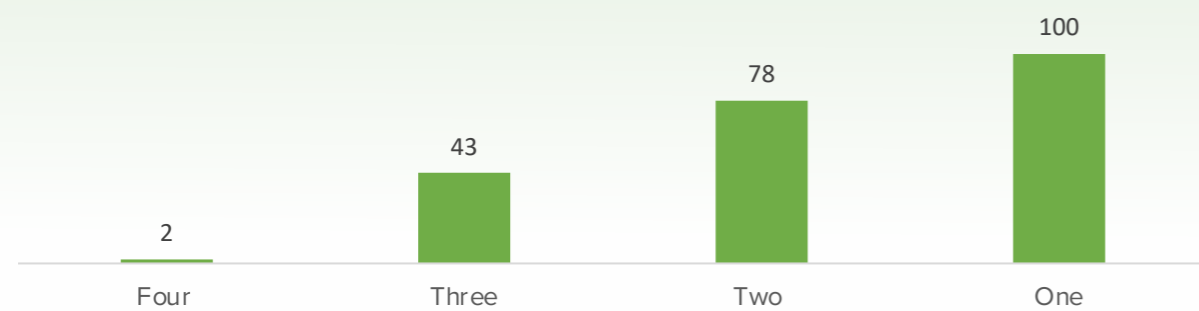
The completion of more cycles of more CALOs has proven to be significant for building resilience against climate-induced income shocks. A higher number of cycles completed, coupled with a higher number of CALOs initiated, will exponentially strengthen the climate resilience of beneficiaries. The table below outlines the percentages of number of cycles completed for the number of CALOs initiated.

Number of cycles completed	1st CALO	2nd CALO	3rd CALO	4th CALO
One cycle completed	41%	37%	26%	2%
Two cycles completed	40%	29%	8%	0.3%
Three cycles completed	15%	3%	3%	0%
Four cycles completed	%	0%	0%	0%

Percentage of Initiated CALOs and Percentage of Implementation of at least One Cycle
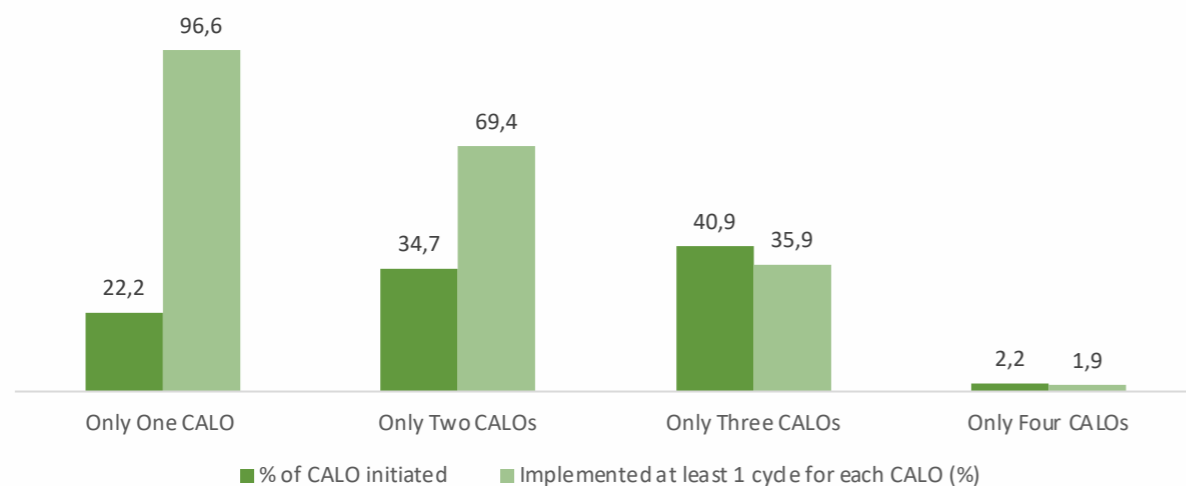
Approximately 97% of beneficiaries reported to have gained a positive return from the implementation of CALOs, highlighting the success of LoGIC's initiative to increase the resilience of vulnerable communities against climate-induced income shocks. The three percent who have reported not to have gained any benefits have been implementing their CALOs for not longer than two months.

An increase in income for beneficiaries is not only an important achievement toward economic empowerment, but also an important determinant of resilience. Approximately 75% of beneficiaries shared that they reinvest positive returns gained from their CALOs into the expansion of their livelihood option by increasing the numbers of livestock or expanding the cultivation of paddy or homestead vegetables.

While in the baseline report, about 11% reported that they had no income sources, in 2021 only 2.2% of surveyed beneficiaries reported not to have a primary source of income. The sources of primary income have also changed since project inception. While in the baseline report poultry/livestock rearing was a primary income source for only 0.6% of beneficiaries, this number has now risen to 6%. The percentage of fishing/shrimp farming as a primary income source has more than doubled since the baseline report, while the employment as transport workers or drivers has increased by 68%.

The share of small businesses as primary income sources has decreased from 8.6% in the baseline to 5.31%. This can be attributed to the economic shocks caused by the COVID-19 pandemic, as well as the taking up of alternative, more profitable and resilient, income options offered by LoGIC.

While in earlier surveys 68% of beneficiaries reported not to have secondary sources of income, a recent survey found that this number has been reduced to only 17%. This highlights LoGIC's success in creating greater financial security for its beneficiaries.

Beneficiaries' capacities to invest in the improvement of their housing is an additional dimension to measure the financial security of the CRF supported households. The housing of many beneficiaries has shifted from traditional to improved structures and many are now able to improve and repair their housing through savings and other available resources.

The money used for house repairs or improvements is predominantly (69.1%) sourced from savings. The dependency on other sources such as loans, LoGIC funding, NGOs, or aid, has been significantly reduced. This underscores the improved resilience of the climate-vulnerable communities in overcoming the damages caused by natural disasters through their own financial resources.
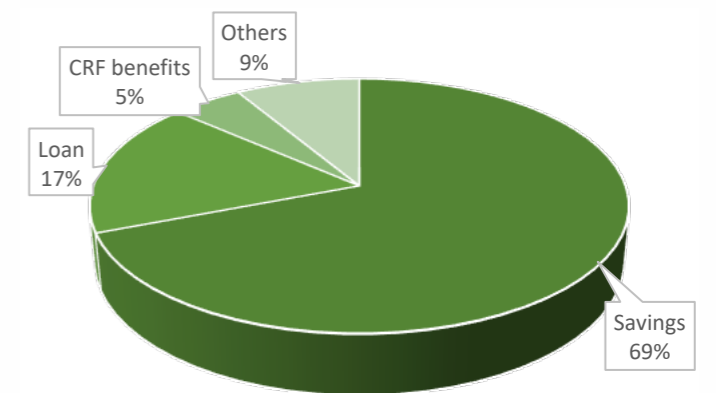
In managing health expenses, 85% of CRF beneficiaries agree that their capability of managing health expenses has been increased.

Community Benefit from PBCRG schemes
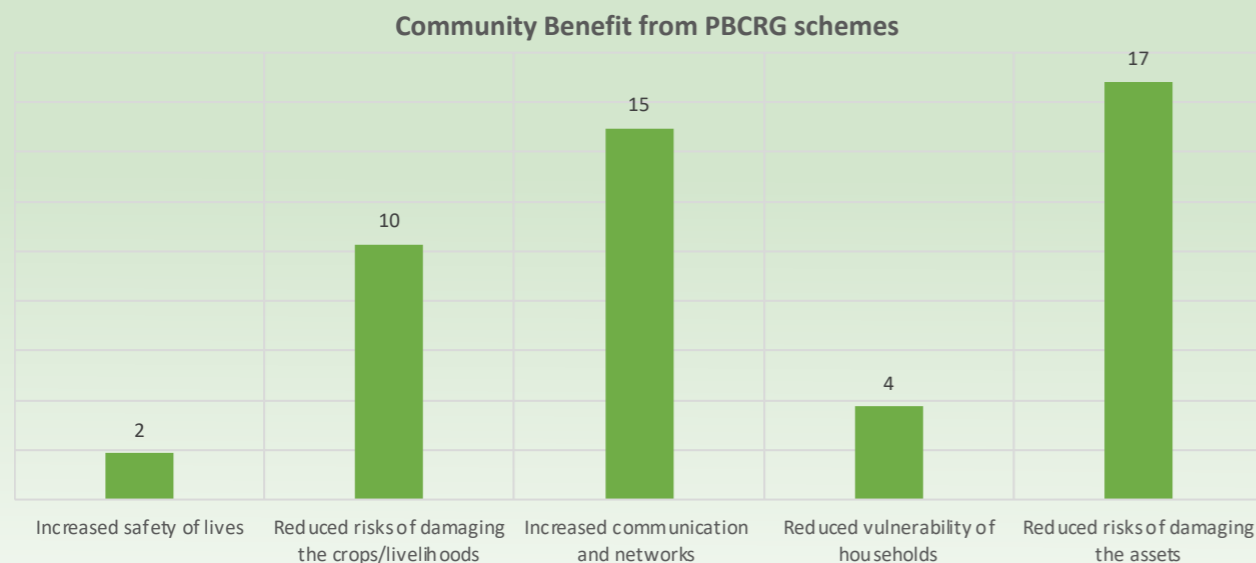
ANALYSIS

In 2021, 100% of the 17,000 CRF beneficiaries completed the implementation of at least one cycle of the climate adaptive livelihood options (CALO). In different districts, the completion rate of the first CALO is higher compared to the second or third CALO. Three cycles have been completed for the first CALO and second CALO. 25% of beneficiaries have completed the second cycle of the first CALO, while only 15 % have completed the second cycle of the second CALO. The number of beneficiaries who are implementing more than one CALO has increased since last year.

The newly selected 18,000 CRF beneficiaries have developed their household RRAPs and group business plans and 6,000 beneficiaries have received training on CALO. The beneficiaries opened their individual and group bank account and received the first tranche of the grants.

KEY LESSONS

Due to COVID-19, 21% of beneficiaries were not able to start the next cycle of CRF livelihoods. CRF livelihood activities started but stopped for 21% of beneficiaries. CRF livelihood of 58% of respondents has not been affected. 24% of beneficiaries had sufficient food in their household, 53% beneficiaries did not have sufficient food and 23% were in food crisis. Almost all types of engagements of daily life were "mostly stopped" due to COVID-19 and associated lockdown for the LoGIC beneficiaries.

The development of a risk management plan and additional measures are required to boost or sustain livelihood activities which have been stopped or damaged due to the pandemic.

PLANS FOR 2022

- Strengthen coordination mechanism to facilitate linkage with the government's extension departments (fisheries, agriculture, livestock & PIO) to ensure support services to 35,000 CRF beneficiaries
- Organize meeting of SMEs and private sector with CRF beneficiaries to facilitate linkages of off-farm producers with local producers
- Disburse second tranche of CRF to the newly selected 18,000 households.

Indicator (2): % of 72 UPs that secure funding to support CCA linked schemes based on their performance
Baseline: 0% (Reference: LoGIC Baseline Study 2018)
Target: 100% (Project Total)
Progress: 100%

PROGRESS

100% of 72 UPs have secured PBCRG funding to support CCA linked schemes based on their performance. As a regular practice, the performance audit of FY 2019-20 was conducted by the enlisted independent audit firm. The audit report shows that all the 72 UPs complied with the six minimum conditions. The performance was assessed in four areas: (1) quality of PBCRG funded schemes; (2) PBCRG schemes targeting and beneficiaries; (3) quality of PBCRG funded schemes implementation process; and (4) capacity for climate risk management.
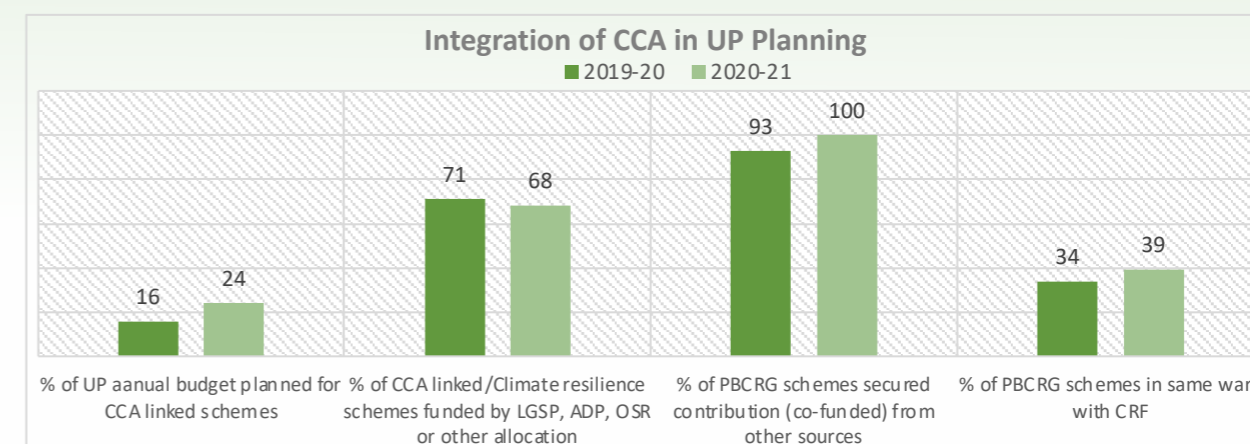
200 PBCRG funded climate change adaptation linked schemes have been selected for the FY 2020-2021 through discussion with community, UPs and DDLGs. The implementation of the selected schemes is under progress.
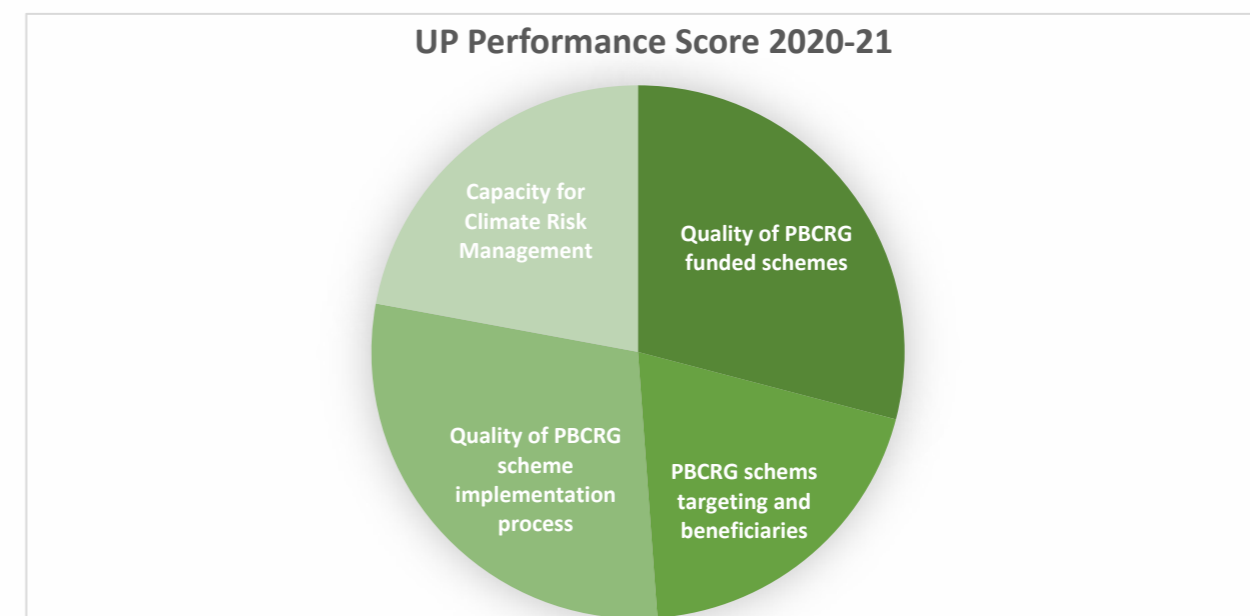
LoGIC focused on the PBCRG investments as adaptation or resilience actions to the vulnerable communities. The PBCRG schemes addressed the local climate change induced risks, local context, as well as socio-ecologically viable and affordable and sustainable actions.

ANALYSIS

There were six minimum conditions for UPs to be eligible for the PBCRG. Accordingly, in 2021 an indicative allocation was given to 72 UPs for the selected 200 schemes. 72 UPs prepared 200 CCA linked schemes based on that allocation and received the PBCRG funding. UP performance in CCA linked scheme implementation was considered to define the UP-wise PBCRG allocation. The UP performance audit report revealed that the UPs are still weak in targeting and selection of beneficiaries for the CCA schemes. Moreover, the UPs require more support to improve climate risk management.

KEY LESSONS

Awareness of UPs on local level climate risks plays an important role in the prioritization of adaptation measures. LoGIC prepared an area specific climate scenario based on climate risk atlases and shared it with UPs to help them understand what types of schemes are more relevant for climate change adaptation and which are development projects.

The sustainability of certain adaptation interventions (e.g., some nature-based solutions) require continued efforts from the project and UPs which in some cases may also require some post implementation expenditure. COVID-19 and cyclone Yaas were two challenges which have delayed planning and implementation of PBCRGs.

PLANS FOR 2022

- Disbursement of third round of PBCRG to 72 UPs
- Implementation of 200 PBCRG schemes of 2020-21
- PBCRG scheme selection for 2021-22
- Design and cost estimation of the PBCRG schemes 2021-22
- Implementation of PBCRG schemes of 2021-22
- Conduct Annual UP performance audit
- Feasibility study of climate resilient business enterprises (jointly by UNCDF & UNDP)

Indicator (3): % of Open Budget sessions in 72 UPs that discussed CCA linked expenditure
Baseline: 6.9% (Reference: LoGIC Baseline Study 2018)
Target: 90% (Project Total)
Progress: 100% of Open Budget sessions in 72 UPs that discussed CCA linked expenditure

ANALYSIS

All UPs are supposed to organize an open budget meeting once in every fiscal year as a step to establish downward accountability. In 2021, all the UPs organized open budget meetings, although the participation of the concerned officials and UP body was not satisfactory. 23% of the participants were female.

LoGIC also supported the UPs to discuss the climate change issues in the 96% of Wardshava held in the reporting period. The participation of poor communities in Annual Development Planning, Open Budget Meeting and Ward Shabha were approximately 33, 35 and 37% respectively. This meant that concerns of vulnerable communities were regularly heard and discussed. The participation of people of marginal communities in the aforementioned meetings ranged from 2.3 -3.3%.

KEY LESSONS

The community members and UP representatives need to clearly know of the climate changes issues. In most cases they can perceive only the disasters and its consequences. They are also not well informed about the process of local development planning and the role they can play in the process. LoGIC developed a manual on Wardshava meetinsg to make it effective. If the Wardshava are effectively organized, then the open budget meetings can be fruitful.

PLANS FOR 2022

- Facilitate the process of UPs to disclose or share planned expenditures with community at open budget meetings
- Produce a report on the implemented PBCRG schemes of 2019-20
- Produce a report on the implemented PBCRG schemes of 2019-20 (including data collection)

RESULT 3: Experience and evidence inform and contribute to further improvements in policies and practices for UPs and national systems in relation to climate change adaptation.

The result focuses on the collection and consolidation of evidence from the implementation of the models, in accordance with a common knowledge management and learning framework set up under the project. For this, the project will implement extensive monitoring of processes, outputs and outcomes to build the necessary evidence to demonstrate relevance, effectiveness and potential for sustainability. This will form the basis for targeted advocacy to mainstream good practices of results into relevant planning and strategic decision-making processes. It is important to note that this evidence will be in place by year 3, so that project partners can focus activities in the last year of the project on promoting the scaling up of good practice models within the project areas and organizing more targeted evidence-based advocacy.

ACTIVITY PROGRESS

LoGIC organized an Annual Planning Meeting on 13 January 2021. The project staff, local government division officials, UNCDF representatives, Resident Representative of UNDP, Deputy Project Director and National Project Director of LoGIC attended the meeting and developed an integrated work plan for 2021 considering the existing COVID-19 pandemic. The planning was also focused on the project's two-year extension till December 2022 for promoting local-led adaptation in Bangladesh.

LoGIC conducted its fourth round of the light touch survey (Kemon Achen-How are You?) of the project beneficiaries through telephonic interviews with 426 beneficiaries. The survey, which was conducted from 11-20 August 2021, was an attempt to understand the immediate impact of COVID-19 on the health, income, livelihood, education and the social condition of the project beneficiaries. This study helped the project and relevant stakeholders to understand the consequences of the climatic and non-climatic disasters and their economic, social, and cultural impacts.

LoGIC organized two meetings of the Project Steering Committee (PSC). Both meetings were chaired by Mr. Helal Uddin Ahmed, Senior Secretary, Local Government Division. Participants from GoB, European Union in Bangladesh, Embassy of Sweden in Dhaka, UNDP Bangladesh and UNCDF reviewed the resolutions of previous meetings, project progress, advocacy issues, planning for extension phase and the project's exit strategy.

A meeting of the project implementation committee (PIC) was held in the reporting period. Ms. Saila Farzana, Joint Secretary, Local Government Division & National Project Director (NPD), LoGIC project chaired the 4th PIC meeting of the project. PIC members including representatives of Ministries, UNDP and UNCDF Bangladesh attended the meeting.

As a part of monitoring, LoGIC staff conducted regular ZOOM meetings with Community Mobilization Facilitators (CMFs) and provided necessary feedback, guidance, and action points on the implementation of project activities in the context of the ongoing pandemic. Regular phone calls were made to the CRF beneficiary group presidents/secretaries/cashieries and UP Chairperson and member to collect information on CALO implementation progress and PBCRG funded scheme implementation status.

DDLGs of LGD carried out physical monitoring visits and organized ZOOM meetings with the Upazila line departments of the Government and UNOs to follow up the implementation progress on the ground.

Indicator (1): The extent to which National Adaptation Plan (NAP) and 7th Five Year Plan (7FYP) integrate financing for local adaptation.
Baseline: 0 (No) (Reference: LoGIC Baseline Study 2018)
Target: Yes (Scale 1-10) (Project Total)

PROGRESS

Progress was not measured in the reporting period. NAP preparation is under progress by MOEFCC and NDA to GCF for Bangladesh. In the mid-term evaluation (Report will be available in March 2022) the progress will be assessed.

PLANS FOR 2022

- Climate Change Adaptation Advocacy National Level Event (National Policy Dialogue)
- Round table discussion on Climate Change Adaptation Policy Strategy
- Quarterly Progress Review meeting (LGD, DDLG, UNDP/UNCDF & Project team)
- Coordination meeting (half yearly) with different level stakeholders at district level
- Meeting with different ministries, CSO and other stakeholders on climate financing
- Policy review workshop on gap analysis of policy on climate change adaptation and local level climate financing
- Publish policy brief on climate issues in newspapers and website
- Develop and publish policy notes for national level
- Organize Adaptation Fair (Offline event in Dhaka)
- Dialogue and consultation on Financing for climate vulnerable people
- Meeting on Safeguarding the climate investment: a) Climate risk insurance, b) Environmental risk insurance and c) Disaster risk insurance

Indicator (2): The extent to which local climate financing framework is integrated into the national Climate Financing Framework.
Baseline: 0 (No) (Reference: LoGIC Baseline Study 2018)
Target: Yes (Scale 1-10) (Project Total)

PROGRESS

A Local Climate Financing Framework (LCFF) model has been developed based on LoGIC's experience. LoGIC has shared the LCFF with the Local Government Division (LGD) to ensure a policy provision for LCFF in the revised Climate Financing Framework (CFF). Once the LCFF model is recognized in the National Climate Financing Framework and tested, the LGD will have enhanced capacity to scale up it to all vulnerable UPs.

PLANS FOR 2022

- LoGIC website management and updating
- Stakeholders' consultation at national level and policy advocacy event
- Community radio to profile issue of climate change
- Media engagement for project visibility and highlight delegates/reps
- Social media mobilization
- Compiling good practices and evidence
- Youth and Women engagement
- Project Board Meeting
- Project Implementation Committee (PIC) Meeting
- Project Steering Committee (PSC) Meeting

ANNEX III - PROGRESS AGAINST THE LOGICAL FRAMEWORK OF THE PROJECT

Intervention Logic	Objectively Verifiable Indicators (OVI)	Baseline (Jan, 2018)	Target (By 2021)	Achievements Till Date
Specific Objective: Improved and inclusive local level planning and a strengthened financing mechanism for community-based climate change adaptation solutions through local governments.	% of target UPs that incorporated climate change adaptation into their development plans.	13.9%	100%	▪ 100% UPs have incorporated climate change adaptation into their annual and five-year development plans through developing Risk Reduction Action Plan (RRAP). *In 2021, Climate Change Adaptation (CCA) actions were integrated and streamlined through UP schemes. This year, 72 UPs planned 863 CCA linked schemes, a 3 percent increase from last year. Nature-based solutions and safe water supply were given focus in this year.*
	% of target UP plans that have addressed the adaptation needs and priorities of vulnerable girls and women	6.9%	50%	▪ 100% of UPs have prioritized adaptation needs and priorities of vulnerable women and girls. *In 2020, 47% of the UP CCA linked schemes supported the most climate vulnerable poor, 32% schemes marginalized groups, 35% climate change adaptation needs of vulnerable women and girls and 1 percent supported the CCA needs of climate refugee households.*
	% of UP that established and are implementing the Climate Resilience Financing system	0%	80%	▪ 99% of the UPs established and implemented the PBCRG with their own financing and accounting system and supported CRF interventions with their administrative system (understand the CRF mechanism, fully engaged in the process, redress the grievances mechanisms and aware about the types of work CRF beneficiaries are undertaking in curving down their climate change vulnerabilities). *Integration of CCA in UP planning has significantly increased compared to*

Intervention Logic	Objectively Verifiable Indicators (OVI)	Baseline (Jan, 2018)	Target (By 2021)	Achievements Till Date
				the previous year, which is a significant progress to achieve the LoGIC objective- to establish a financial mechanism for climate resilient action at local level.
	% of target UPs that are allocating other resources to implementing CCA linked schemes.	0%	70%	▪ 71% of target UPs that mobilized additional resources from different sources for climate resilience schemes. *In 2020, the progress indicated 7% increase from 2019. This also indicates the UPs are more aware and educated about the climate change issues.*
Result 1: Strengthened capacity of local governments, households, and other local stakeholders to develop local plans that integrate CCA-DRR solutions.	% of women, poor and marginalized people that participate in the formulation of climate risk integrated LDPs	1.3%	52%	▪ 100% of the newly selected 18,000 CRF beneficiaries (100% women, 6% representative of marginal occupational group, 4% Persons with Disability-PWD representatives and 1% indigenous people, 24% farmer, 4% fisherfolk, 49% day labor, 9% women headed, 77% landless (Agricultural), 43% living on or outside embankment) participated in the household risk reduction action plan (HH-RRAP) developing process.
	% of target UPs that integrate CCA solutions into LDPs to support the most vulnerable households.	31.9%	100%	▪ 100% of targeted 72 UPs integrated climate change adaptation (CCA) solutions into the local development plans (LDP). *The strategic poverty and political economy analysis of PBCRG schemes is under progress, it will help to better understand how PBCRG are benefiting the most vulnerable.*
Result 2: Established financing mechanism to fund local	% of target vulnerable (women, poor and marginalized)	10% National	60%	▪ 59% people (78% are female) of the working areas are benefitted by LoGIC interventions.

Intervention Logic	Objectively Verifiable Indicators (OVI)	Baseline (Jan, 2018)	Target (By 2021)	Achievements Till Date
governments and communities for implementing climate change adaptation measures.	households who benefit from CCA finance			*In 2021, 100% of beneficiaries completed one type of CALO. 80% beneficiaries completed 2 types and 46% completed 3 types of CALO in the project area. 39% of the CRF beneficiaries are confident to implement any CALO without support from LoGIC.*
	% of target UPs that secure funding to support CCA-linked schemes based on their performance	0	100%	▪ 100% of 72 UPs have secured PBCRG funding to support CCA linked schemes based on their performance. *In 2021, allocation was given to 72 UPs for selected 200 schemes. 72 UPs prepared 200 CCA linked schemes based on that allocation and received the PBCRG money. UP performance in CCA linked scheme implementation was considered to define the UP-wise PBCRG allocation.*
	% of open budget sessions in target UPs that discussed CCA linked expenditure	7%	100%	▪ 100% of Open Budget sessions in 72 UPs that discussed CCA linked expenditure. *In 2021, all the UPs organized open budget meeting, although the participation of the concerned officials and UP body was not satisfactory. 23% of the participants were female.*
Result 3: Experience and evidence inform and contribute to	The extent to which National Adaptation Plan (NAP) and 7th Five Year Plan	No	Yes (Scale[2]: 1-4)	NAP preparation is under progress by MOEFCC and NDA to GCF for Bangladesh. General Economics Division (GED) is formulating the 8th FYP.

[2] Scale:
1. Specific commitment to finance local adaptation mentioned
2. Allocations made to finance local adaptation mentioned
3. Specific commitment to finance local adaptation mentioned
4. Allocations made to finance local adaptation mentioned

Intervention Logic	Objectively Verifiable Indicators (OVI)	Baseline (Jan, 2018)	Target (By 2021)	Achievements Till Date
further improvements in policies and practices for UPs and national systems in relation to CCA	(7FYP) integrate financing for local adaptation			*Progress will be assessed in the Mid-Term Evaluation (Report will be available in Jan 2022).*
	The extent to which local climate fiscal framework is integrated into the national Climate Fiscal Framework	No	Yes (Scale: 1-4)	▪ Local Climate Financing Framework (LCFF) model is developed based on LoGIC experience. LoGIC shared the LCFF to Local Government Division (LGD) to ensure a policy provision for LCFF in the revised Climate Financing Framework (CFF). *Once the LCFF model is recognized in the National Climate Financing Framework and tested, the LGD will have enhanced capacity to scale it up to all vulnerable UPs.*

Activities	Achievements during the reporting period	Cumulative achievements since 2017
Result 1- Strengthened capacity of local governments, households, and other local stakeholders to develop local plans that integrate CCA-DRR solutions.		
Activity 1.1: Capacity enhancement plan developed and implemented		
1.1.1: Developing and implementing programme for vulnerable households to transfer skills, knowledge, and technology for resilience building	▪ Selected 18,000 vulnerable households to receive support for climate adaptive livelihoods through CRF ▪ Climate vulnerable 6000 CRF beneficiaries were trained on CALO ▪ Selected 18,000 vulnerable households developed their household risk reduction plan (HRRAP) ▪ Selected 18,000 vulnerable households opened their group bank account and individual bank account ▪ Performance audit of 72 UPs for FY 2019-20 were completed by an external firm ▪ LoGIC organized 19 Upazila meetings to create linkages between CRF beneficiaries and govt's extension departments (fisheries, agriculture, livestock) to ensure support services to climate adaptive livelihood implementation ▪ LoGIC project contributed to protection of local people in the project areas from COVID-19 risks through awareness raising and behavioral changes of local people, distribution of equipment, situational analysis, and development of guidelines on community meetings ▪ LoGIC conducted 4th round of light touch survey- Kemon Achen (How are you?) on project beneficiaries through telephonic interview of 426 beneficiaries. The survey was	▪ Selected total 35,000 vulnerable households for supporting climate adaptive livelihoods by CRF ▪ Training on Climate Adaptive Livelihood provided to 23,000 vulnerable households. ▪ Selected 35,000 vulnerable households developed their household risk reduction plan (HRRAP) ▪ Total 35,000 vulnerable households opened their group bank account and individual bank account. ▪ Training on business plan and value chain provided to selected 17000 vulnerable households. ▪ CSO and Local Institutions mapping completed in all 71 UPs (average 20 CSO and Local Institutions per UP have been listed for capacity development). ▪ Union Level inception workshop organized in 72 UPs out of 72. ▪ District level inception workshop organized in 7 Districts. ▪ LoGIC contracted the Institute of Remote Sensing (IRS) of Jahangirnagar University who prepared district wise climate analysis report for the project area. Based on the climate prediction report, longer-term thinking, and nature-based solution the UP level RRAPs were updated. ▪ LoGIC conducted four rounds of light touch survey- Kemon Achen (How are you?) on project beneficiaries through telephonic interview with 426 beneficiaries. The survey was an attempt to understand the immediate impact of

Activities	Achievements during the reporting period	Cumulative achievements since 2017
	an attempt to understand the immediate impact of Covid-19, cyclone Yaas and floods on the health, income, livelihood, education, and social condition of the project beneficiaries.	Covid-19, cyclone Amphan, Yaas and Floods on the health, income, livelihood, education, and social condition of the project beneficiaries.
1.1.2: Developing and implementing a capacity enhancement strategy (risk informed planning and budgeting) for LGIs (including all standing committees)	24 UPs updated the risk reduction action plan (RRAP) and approved it in their monthly general meeting. The RRAPs were also integrated in the 5-years plan of UP.	▪ Prepared Capacity Development Strategy for LoGIC. ▪ Prepared 31 modules on climate adaptive area specific Livelihood options. ▪ 72 UPs updated the risk reduction action plan (RRAP) and approved in their monthly general meeting. The RRAPs were also integrated in the 5-years plan of UP. ▪ 72 UPs organized open budget meetings and shared their expenditure with community.
1.1.3: Build capacity of the CSOs, local institutions and stakeholders to design and implement accountability mechanism including social audit	A ToT on the process of Social Audit was organized via ZOOM for three districts. The training was attended by 30 project district level staff, community and CSO representatives. It was a two-day long event and followed by four days of PBCRG scheme visits. After the ToT, training on Social Audit was organized in four Unions for 100 UP members, community, and CSO representatives.	● Training package has been designed; the training of UP, CSO and community will be started in next year. ● A ToT on the process of Social Audit was organized on zoom platform for 3 Districts. The training was attended by 30 project district level staff, community and CSO representatives. It was a 2-days long event and followed by 4 days' PBCRG scheme visits. After the ToT, training on Social Audit was organized at 4 Unions for 100 persons of UP, community and CSO representatives.
Activity 1.2: Inclusive community-based adaptation plans developed		
1.2.1. Develop Community Risk Assessment Guideline (Revision)		● Community Risk Assessment (CRA) guideline was revised in 2018 and accordingly LoGIC conducted the CRA. ● LoGIC printed (Big size poster) the Union hazard maps and demonstrated at 72 UPs to visualize the climate risk to the community people.

Activities	Achievements during the reporting period	Cumulative achievements since 2017
1.2.2. Conducting Participatory Risk Assessment (CRA)	To strengthen Climate Change Attribution through risk updating, risk prioritizing and climate modelling, LoGIC prepared a Risk Atlas for 7 Districts, 18 Upazilas and 72 Unions of the working areas to help Union Parishads and community people understand the nature of climate change, forecast future situations, and alert about the possible climate change risks.	▪ Community Risk Assessment (CRA) completed in 100% (72 UPs) Unions. ▪ Developed digital map based on CRA information using the Open Street Map (OSM) platform. ▪ To strengthen Climate Change Attribution through risk updating, risk prioritizing and climate modeling, LoGIC prepared Risk Atlas for 7 District, 18 Upazilas and 72 Unions of the working areas to help Union Parishads and community people understand the nature of climate change, forecast future situations, and alert about the possible climate change risks.
1.2.3. Sharing and prioritizing actions from CRA at Ward Shava (sub-union level planning exercise required by Law).		• In 2019, 100 Wardshava in 71 UPs were provided facilitation support to make it participatory to identify the PBCRG funded schemes and in the way 60% of the schemes are gender responsive. • LoGIC prepared 'Wardshava Facilitation Guidelines' and oriented 71 Union Parishad for effective LDP discussions at the ward level through Wardshava.
1.2.4. Develop Local Development Plans of LGIs incorporating climate and disaster risks		Organized and facilitated 71 planning workshops at 71 UPs to develop climate risk informed annual development plans (LDP) and 5-year development plans. Updated Risk Reduction Action Plan (RRAP) in 72 UPs and to incorporate climate resilience actions into annual development plans (LDP) and 5-year development plans.
Activity 1.3: Community resilience fund operationalised to finance community based innovative solutions for households through the CSOs and local institutions.		
1.3.1. Development of CRF manual	▪ LoGIC organized training on personalized email systems, cloud-based file management, ATM android app data entry, reporting and group communications (WhatsApp/ Messenger) for 94	▪ LoGIC developed a web-based comprehensive system (Adaptation Tracking and Measuring-ATM) to measure and monitor the climate change adaptation and resilience progress of household and

Activities	Achievements during the reporting period	Cumulative achievements since 2017
	Community Mobilization Facilitators (CMF) in four districts.	community in 7 most climate change vulnerable Districts in Bangladesh. ▪ A two-days long residential training on CRF manual was organized for project and partner NGO staff. ▪ Community Resilience Fund (CRF) Operations Manual was approved by Project Steering Committee (PSC) on 6th March 2019. ▪ Hired international who developed the Community Resilience Fund (CRF) Operations Manual including household selection criteria. The manual was vetted by national experts and finally approved by Project Steering Committee (PSC). ▪ Developed Accounting and MIS software. Project trained 71 UP secretaries and 142 partner NGO staff on the Accounting and MIS software, and it is already functioning. ▪ Training on ATM, MIS and accounting software were organized for 150 project staff. Field level project staffs were provided hands-on training on filed-level data entry in changing context, future risks, use of grants etc. in the app tab-based ATM software. ▪ LoGIC organized training on personalized email system, cloud-based file management, ATM android app data entry, reporting and group communications (WhatsApp/ Messenger) for 94 Community Mobilization Facilitators (CMF) in 4 Districts.
Result 2-Established financing mechanism to fund local governments and communities for implementing climate change adaptation measures.		
Activity 2.1: Performance based climate resilient grants (PBCRG) system is developed and implemented through LGIs		
2.1.1. Determination of formula-based grants allocation to	▪ Performance Based Climate Resilience Grants (PBCRG) amount of USD 2.60 million was disbursed	▪ The formula-based allocation of PBCRG (FY 2020-21) provided to 72 UPs (UP).

Activities	Achievements during the reporting period	Cumulative achievements since 2017
UPs, weighted by climate change vulnerability performance and other parameters. (Action: Development of a catalogue of climate adaptation and resilience related performance measures).	to 72 UPs for implementation of 200 schemes of FY 2020-21.	- PBCRG Operations manual developed. - Developed climate proofing and climate adaptive infrastructure menu for UPs. - Prepared fiduciary risk management manual. - LoGIC defined a formula-based grants allocation system for UPs. - Performance Based Climate Resilience Grants (PBCRG) amount of USD 7.91 million was disbursed to 72 UPs for implementation of 653 schemes.
2.1.2. Development of a monitoring mechanism to track CCA-DRR funds flow at national and local levels, according to specific performance indicators	Conducted training of 72 UPs to monitor expenditure and implementation of CCA schemes as the part of fiduciary risk management.	- A workbook (UP performance evaluation tool) has been developed to conduct the UP-performance evaluation. - Grants monitoring mechanism has been included in project monitoring and evaluation framework. - A two-days long residential training on PBCRG manual was organized for project and partner NGO staff. - A workbook (performance evaluation tool) has been developed to conduct the UP-performance evaluation. - Conducted training of 72 UPs to monitor expenditure and implementation of CCA schemes as the part of fiduciary risk management.
Activity 2.2 Performance of LGIs is assessed for compliance with mandatory requirements and superior performance		
2.2.1. Support to the annual performance assessment of LGIs for compliance with mandatory requirements and superior performance.		An auditor's firm had been hired to audit the annual performance of the UPs. Project provided day-long training to the auditors on UP performance assessment tool.
2.2.2. Transfer of Performance Based Climate Resilience	PBCRG amount of USD 2.60 million was disbursed to 72 UPs for the implementation of 200 schemes.	Total PBCRG amount of USD 7.91 million has been disbursed to 72 UPs for the implementation of 653

Activities	Achievements during the reporting period	Cumulative achievements since 2017
Grants (PBCRGs) to qualified UPs		schemes.
Activity 2.3: Community Resilience Fund (CRF) operational		
2.3.1. Develop Community Resilience Fund for LGIs and CSOs and local institutions to support vulnerable households.		A two-days long residential training on CRF manual was organized for project and partner NGO staff.
2.3.2. Disbursement, result, and compliance monitoring of resilience grants for adaptive livelihoods of vulnerable households.	- Selected 18,000 vulnerable households to receive support for climate adaptive livelihoods through CRF - Disbursed CRF amount of 3.78 million USD.	- Selected total 35,000 climate vulnerable households for supporting climate adaptive livelihoods by CRF. Disbursed total USD 9.72 million to the CRF beneficiaries. - Developed a participatory and technology-based vulnerability assessment and computerized method (algorithm) for Community Resilience Fund beneficiary selection.
Activity 2.4: CCA-DRR financing at local level enhanced by the active participation and scrutiny of communities and CSOs, local stakeholders and institutions		
2.4.1. Engagement of CSOs and local institutions in the oversight of LDPs on community-based planning, grant utilization, and schemes' implementation to assure quality, accountability, and community ownership.		- Local institutions/CSOs selection criteria has been drafted for identifying local institutions and CSOs for this support. The criteria are approved by the Project Steering Committee (PSC). - Prepared 71 Union wise list of CSO and Local Institutions. - LoGIC developed the Social Audit protocol to engage the CSO and local institutions at UP level.
2.4.2. Delivery of grants monitoring report by CSOs and local institutions		
2.4.3. Inclusion of monitoring, reporting and verification (MRV) into PMU.	Organized Annual Planning Meeting 2022 with the participation of Sr. Secretary LGD, NPD, DPD, DDLG, UNDP, UNCDF and project staff.	- Organized quarterly progress review meeting (Total 6 meeting) with the participation of project staff and stakeholders. - Project Management Unit (PMU)

Activities	Achievements during the reporting period	Cumulative achievements since 2017
		and District level staff regularly conducted monitoring visits to the UPs and beneficiary household level. ▪ Completed project baseline study. (The report was published) ▪ Developed strategic result framework for LoGIC. ▪ Developed LoGIC M&E framework and guidelines. ▪ A mid-term evaluation (Formative) of LoGIC project was conducted by Implementation, Monitoring & Evaluation Department (IMED), Ministry of Planning. ▪ UNDP, UNCDF, PMU and District level staff regularly conducted monitoring visits to the UPs and beneficiary household level. ▪ Organized quarterly progress review meeting virtually with the participation of project staff and stakeholders.
Result 3: Experience and evidence inform and contribute to further improvements in policies and practices for UPs and national systems in relation to CCA		
Activity 3.1: Designing and implementing systems to learn lessons at the local level and informing the policy dialogue at the national level.		
3.1.1. Review current policy provisions and develop a strong policy case for financing local level adaptation and disaster risk reduction.		LoGIC organized policy dialogue focused on (1) Revisiting allocation rationale from the perspective of climate change, (2) Consolidation of climate informed planning and budgeting at local level.
3.1.2. Publish a synthesis policy notes for senior policy makers and parliament.		
Activity 3.2: Collecting and sharing of experiences supporting and hindering the process on local climate financing.		
3.2.1. Develop and publish issue-based policy briefs.		
3.2.2. Develop and		

Activities	Achievements during the reporting period	Cumulative achievements since 2017
publish knowledge products based on field evidence and lessons.		
Activity 3.3: Informing and advocating for adoption of national policies that embrace the proposed methodology.		
3.3.1. Local level policy discussions		
3.3.2. District level policy discussions		
3.3.3. National level policy discussions		▪ NAP has started in 2020 and will be completed in 2021. The 8th FYP will be finalized in 2021. ▪ Therefore, most feasible indicator will be to integrate the LoGIC lessons into NAP and 8th FYP with better cross-integration of NAP and 8th FYP.
Activity 3.4: Integrate local climate fiscal framework lessons into the national climate fiscal framework.		
3.4.1. Establish partnership amongst Finance Division, Planning Commission, Local Government Division, Ministry of Environment and Forest, and Ministry of Disaster Management and Relief.		
3.4.2. Policy discussion with Finance Division for inclusion of LCFF into CFF		▪ Local Climate Fiscal Framework (LCFF) was drafted based on the CRA-RRAP and PBCRG and CRF experience of LoGIC.

Sl.	Project Risk *This is mandatory. Please add project risks which your project has identified during the reporting period.*	Likelihood (High/Moderate/Low)	Mitigation Measure *Each mitigation measure should respond to the project risk in the left column.*
1	Fiduciary risks of re-purposing the CRF by the project beneficiaries to meet COVID-19, cyclone, and other emergency responses.	High	Safeguarding climate adaptive livelihood options were implemented through close monitoring.
2	Risk of non-transformative resilience of CRF beneficiaries because a year-round calendar for seasonal and continuous adaptation of their livelihoods is available.	Moderate	A yearlong district wise climate adaptive livelihood seasonal calendar was developed and skill transfer to the CRF beneficiaries was ensured.
3	Risk of continuation and M&E of project interventions under the current COVID-19 situation.	Moderate	The project ensured project preparedness and modeling of interventions considering the pandemic situation. Alternative ways of data collection to assess the project progress are being sought.
4	Risk of further project delay due to slow administrative processes in approval of revised DPP and other related documents	Moderate	The project discussed the issue with the PIC and DPs to expedite the administrative process.
5	Risk of continuity and assessing of project interventions under the current Covid-19 situation.	Moderate	Ensure project preparedness and modeling of interventions considering the pandemic situation. Find alternative ways of data collection to assess the project progress.
6	Risk of hampering the ward census in Covid-19 pandemic and monsoon rain	Moderate	Ensure alternative plan according to available workforce and considering the situation to meet the deadline.
7	Risk of corona virus infection of Community Mobilization Facilitators (CMF).	High	Continue the census data collection in a limited manner or stop according the Covid-19 pandemic situation.
8	Risk of slow progress of project activities due to Union Parishad election.	Moderate	Maintain careful relationship with UPs and involve DDLG and UNOs in decision making and implementation.

ANNEX VI - ACTIVITY SCHEDULE FOR JANUARY TO DECEMBER 2022

Code	Activities/Sub-activities	Target	Q1	Q2	Q3	Q4	Responsibility	Support	Aim of the Activities
Result 1	Strengthened capacity of local governments, households, and other local stakeholders to develop local plans that integrate climate change adaptation measures and disaster risk management.								
1.1	CRF beneficiary selection (3rd Round)	10000					DCCC	MS, MISO	Select beneficiaries (Who will get only CALO training)
1.2	Training on CALO for CRF beneficiaries (NIM)	12000					DCCC	CBO	Capacity building of the beneficiaries
1.3	Training on CALO for CRF beneficiaries (Firm) 1 CALO for 17000, 2 CALO for 18000, 1 CALO for 10000	45000					BRAC	CMF, DCCC, CBO	Capacity building of the beneficiaries
1.4	Capacity building of CRF beneficiaries on financial inclusion services and market linkage	35000					PCC & MEC	CMF, DCCC, CBO	Increase access of beneficiaries to financial services and market
1.5	Facilitate the opening of beneficiary Group Bank Account in 6 districts	923 groups					PCC & MEC	CMF, DCCC	Disbursement of the CRF
1.6	Facilitate the opening of Mobile Wallet for beneficiaries	35000					PCC & MEC	CMF, DCCC	Increase access of beneficiaries to financial services
1.7	Providing training to beneficiaries' group leaders on access to financial resources, services, and markets (Firm)	8000					PCC & MEC	CMF, DCCC, CBO	Increase access of beneficiaries to financial services and market
1.8	Providing training of trainers (ToT) to CMFs on access to financial resources, services, and markets (Firm)	143					PCC & MEC	CMF, DCCC, CBO	Ensure support to beneficiaries on financial services and market
1.9	Mapping the possible markets e.g., processors, retailers, local and national markets, private sectors (Firm)						PCC & MEC	CMF, DCCC, CBO	Strengthen linkage between beneficiaries and market
1.10	Facilitate communication and rapport building between project beneficiaries and markets (Firm)						PCC & MEC	CMF, DCCC, CBO	Strengthen linkage between beneficiaries and market
1.11	Strengthen linkages between project beneficiaries and Upazila level govt. line department officials e.g., agriculture, livestock, fisheries etc. (Firm)	19 Upazila					PCC & MEC	CMF, DCCC, CBO	-Ensure support to CRF beneficiaries on CALO -Support to UP on PBCRG scheme implementation
1.12	Share knowledge and guidance on business plan with the beneficiaries (Firm)						PCC & MEC	CMF, DCCC, CBO	Plan the CALO activities

ID	Activity	Target	PCC & MEC	CMF, DCCC, CBO	Purpose
1.13	Facilitate contract farming on climate resilient livelihood for the beneficiaries			CMF, DCCC, CBO	Ensure support to CRF beneficiaries on CALO
1.14	Organize meeting of SMEs & private sectors with CRF beneficiaries to make linkage the off-farm producers with local producers	19 Upazila	DCCC	PMU	Strengthen linkage among SMEs & private sectors and CRF beneficiaries
1.15	Organising consultation meeting with stakeholders, local project officials and local cooperative officers on cooperative formation and registration	17 Consultations	Consultant	DCCC, CBO	Orientation on cooperative
1.16	Formation of Upazila based Cooperatives of CRF partners	19	Consultant	DCCC, CBO	Formation of Cooperatives
1.17	Formation of Cooperatives Union at national level	1	Consultant	DCCC, CBO	Formation of Cooperatives
1.18	Legal registration of the formed cooperatives		Consultant	DCCC, CBO	Formation of Cooperatives
1.19	Workshop on cooperative management, resource mobilization, business planning, record keeping and accounts keeping	7 Workshops	Consultant	DCCC, CBO	Capacity building on Cooperatives functions management
1.20	Training on cooperative formation – responsibilities and priorities for 50 group leaders and co-group leaders	28 batch	Consultant	DCCC, CBO	Capacity building on Cooperatives functions management
1.21	Develop business plan on tourism (Kurigram, Sunamganj and Khulna)	3	Consultant	DCCC, CBO	Initiate tourism activities
1.22	Youth group formation at ward level	225 wards	CMF	DCCC, CBO	Youth engagement in climate change adaptation activities
1.23	Youth federation formation at union level	72 UPs	CMF	DCCC, CBO	Youth engagement in climate change adaptation activities
1.24	Youth federation formation at district level	7 districts	DCCC	CMF, CBO	Youth engagement in climate change adaptation activities
1.25	Basic training for youth groups on climate change	7 districts	DCCC	CBO	Youth engagement in climate change adaptation activities
1.26	Training workshop on youth engagement in climate change adaptation	7 districts	DCCC	CBO	Youth engagement in climate change adaptation activities
1.27	Training to youths on organizational development, communication, networking, advocacy, leadership, entrepreneurship and value chain	7 districts	DCCC	CBO	Youth engagement in climate change adaptation activities
1.28	Establishing linkage with national level youth network(s)		CBO	DCC, PMU	Youth engagement in climate change adaptation activities
1.29	Youth workshop on climate change at district level	7 districts	DCCC	CBO	Youth engagement in climate change adaptation activities
1.30	Youth workshop on climate change at national level				Youth engagement in climate change adaptation activities
1.31	Organize cross learning visits (within district) for the CRF beneficiary groups	72 UPs	DCCC	CBO	Learning sharing on CALO
1.32	Risk updating, Risk prioritizing and develop climate model of 7 Districts, 13 Upazila and 72 Unions (DCRAM)	92 Maps	DCRAM	DCFC, TS(C)	Informing and integrating climate risk information at local level
1.33	Training for the UPs, govt. officials, CSO and local institutions on the process of climate risk informed LDP and RRAP	46 UPs	DCFC	TE(C)	Engagement of local stakeholders in climate resilient actions
1.34	Training of UPs to monitor expenditure and implementation of CCA schemes as the part of fiduciary risk management	72 UPs	DCFC	TE(C)	To reduce fiduciary risks
1.35	Training of 72 UPs on the process of social audit	44 UPs	DCFC	CBO	Strengthen downward accountability of UPs
1.36	7 days residential training for CMF on organizational development, entrepreneurship, and leadership	7 districts	CBO	DCCC	Capacity building of CMFs
Result 2	**Established financing mechanism to fund local governments and communities for implementing climate change adaptation measures.**				
2.1	Disbursement of Performance Based Climate Resilient Grant (PBCRG) to Ups	72 Ups	PMU	UNCDF	Implement climate resilient schemes
2.2	PBCRG scheme selection	72 UPs	DCFC	TE(C), PE	Implement climate resilient schemes
2.3	Designing and cost estimation of the PBCRG schemes	72 UPs	PE	DCFC, TE(C)	Implement climate resilient schemes
2.4	Implementation of PBCRG schemes	72 UPs	DCFC		Climate change adaptation
2.5	Facilitate the process of UPs to disclose or share planned expenditures with community at open budget meetings	72 UPs	DCFC	UP Representatives	Strengthen downward accountability and transparency of UPs
2.6	Produced a report on the implemented PBCRG schemes	1	TE(C)		Documentation of actions
Result 3	**Experience and evidence inform and contribute to further improvements in policies and practices for UPs and national systems in relation to climate change adaptation.**				
3.1	Quarterly Progress Review meeting (Participated by LGD, DDLG, UNDP / UNCDF & Project team)	3 Meetings			Progress Review and planning
3.2	Coordination meeting with different level stakeholders at District level	7 Meetings	DCCC	CBO	Progress Review and planning
3.3	Organize advocacy meeting with different ministries, CSO and other stakeholders on climate financing	1	PMU		Advocacy

No.	Activity	Target	Responsible	Category
3.3	Organize advocacy meeting with different ministries, CSO and other stakeholders on climate financing	1	PMU	Advocacy
3.4	Organize Policy review workshop on gap analysis of policy on climate change adaptation and local level climate financing	1	PMU	Advocacy
3.5	Consultation with different stakeholders (national level) on vulnerability index finalization and implementation	2		Advocacy
3.6	Organize annual sharing meeting with different ministries, media, CSO and other stakeholders/Learning sharing and public announcement of the extension phase			Advocacy
3.7	Conduction of Climate Adaption Advocacy National Level Event (national Policy Dialogue event, Round table discussion event, Publication on policy advocacy outcome			Advocacy
3.8	Develop and publish policy notes for national level	2	PMU	Advocacy
3.9	Publish policy brief on climate issues in newspapers and website	1	KM&CO	Advocacy
3.10	Stakeholders' consultation at national level and policy advocacy event	3	PMU	Advocacy
3.11	Media engagement for project visibility and highlight delegates/reps	2	KM&CO	Mass communication and visibility
3.12	Project Board Meeting	4	PMU	Progress Review and planning
3.13	Project Implementation Committee (PIC) Meeting	4	PMU	Progress Review and planning
3.14	Project Steering Committee (PSC) Meeting	2	PMU	Progress Review and strategic decision
3.15	National level consultation on inclusion of climate rationale into the LGD resource allocation	1	PMU	Advocacy
3.16	Dialogue and consultation on Innovative financing, blended financing, investment financing (mutual fund/bond) for the Climate vulnerable people	Exploration	PMU	Advocacy
3.17	Meeting on Safeguarding the climate investment: a) Climate risk insurance, b) Environmental risk insurance and c) Disaster risk insurance including embankment	As per need	PMU	Advocacy
3.18	Divisional Workshop with GoB (Barisal & Khulna)	2	PMU	Advocacy
3.19	LoGIC website management & upgradation		PMU	Mass communication and visibility
3.20	Climate Adaptation Advocacy National Level Event		PMU	Advocacy
3.21	Audio visual production of schemes, full overview of LoGIC project		PMU	Mass communication and visibility
3.22	Photograph capture, compile & develop stories from multiple schemes		PMU	Mass communication and visibility
3.23	Publication of policy advocacy outcome, LoGIC booklet		PMU	Mass communication and visibility
3.24	Social media mobilization (Facebook, Twitter) for result promotion and visibility		PMU	Mass communication and visibility
3.25	National Media engagement		PMU	Mass communication and visibility
3.26	Media/journalist visits		PMU	Mass communication and visibility
3.27	Promotional Items (calendar, folders, notebook, pens, jute bag, cap, T-shirts etc.)		PMU	Mass communication and visibility
3.28	Installing display panel for CRF groups to share project information		PMU	Mass communication and visibility
3.29	Youth and women advocate development for awareness raising; climate adaptation champions award		PMU	Mass communication and visibility
3.30	Local IEC Materials- LoGIC stickers, posters at schools, community households and UPs		PMU	Mass communication and visibility

Eco-Tourism
Local Government Initiative on Climate change (LoGIC)

Inception Report
with
Detail Work Plan

UNDP
Empowered lives.
Resilient nations.

Submitted by:

Taufiq Rahman
National Consultant, Eco-Tourism Expert

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Executive Summary

Government of Bangladesh focusing on Sustainable Development Goals (SDGs) and among the seventeen goals, no. 8, 11 and 13 are closely related with tourism development in Bangladesh. Bangladesh government has laid huge emphasis on developing tourism as an economic sector of the country. The government introduced National Tourism Policy-2010 and established Bangladesh Tourism Board to implement the policy. The National Tourism Council (NTC) the body for tourism headed by the Honorable Prime Minister of the Government of the People's Republic of Bangladesh gave a clear instruction to prepare a short-term, mid-term and long-term tourism development plan. Following this instruction, Bangladesh Tourism Board has been given the responsibility to prepare a Tourism Master Plan in the 7th and 8th Five Year Plan of Bangladesh. In this conducive scenario, LoGIC thinks ahead for the climate vulnerable communities to include in the wider tourism industry by promoting community based Eco-Tourism and thus sustaining the environment and heritage.

Product Development Business plan (Draft 01): Tanguar Haor, Sunamganj

Tanguar haor located in the Dharmapasha and Tahirpur upazilas of Sunamganj District in Bangladesh, is a unique wetland ecosystem of national importance and has come into international focus. The area of Tanguar haor including 46 villages within the haor is about 100 square kilometres (39 sq mi) of which 2,802.36 ha2 is wetland. It is the source of livelihood for more than 40,000 people. It has been seen on the spot that tourists are coming mainly to Tanguar Haor, Watch Tower, Shaheed Siraj Lake (Niladri Lake), Bareker Tila, Jadukata River and Shimul Bagan. Map of Tanguar Haor in Sunamganj District is shown below:

Product Development Business plan (Draft 02): Kurigram

Several rivers flow through the center of Kurigram. The major rivers are the Brahmaputra, Dharla, and Tista. Minor rivers include the Dudhkumar, Phulkuar, Gangadhar, Jinjiram, and others. The three northern upazilas of the district have recently been connected to the southern upazilas by a bridge over the *Dharla river*. Chilmari Port is located at the bank of the Brahmaputra River about 35 kilometer south from Kurigram district headquarter. Two years before, Bangladesh Inland Water Transport Authority (BIWTA) has signed an MOU with its Indian counterpart (BIWTA) for the smooth operation of India-Bangladesh river cruise- where Chilmari border and port will be the entry/exit point from a cruise from Guwahati- Dhaka- Kolkata river route that may change the livelihood scenario in and around the port area.

Product Development Business plan (Draft 03): Khulna

The Sundarbans Reserve Forest (SRF) is home to millions of Bangladeshis who depend on the mangroves for food, livelihoods, and protection against cyclones. The proposed activities will be focused on developing tourism in the Sundarbans where the majority of visitors enter and exit the reserve – primarily along the Passur River and adjacent tributaries and sites along with the community depends on their livelihood on Sundarban. Mongla port also offers easy access to the SRF for day trips. Visitors departing from this port are almost exclusively domestic day trip users to the Karamjal visitor center with a small number also visiting Harbaria a little further into the Reserve.

This Inception Report reflects on the ToR, confirm our approach and points to some of the information already encountered. It comprises our **understanding of the project and methodology, working area of LoGIC, project objectives, scope of work, deliverables/ outputs, work plan, present tourism in Bangladesh, spatial tourism product**, c**limate vulnerability and tourism, community based eco-tourism, community engagement, business plan, community business, institutional approach, safety and security, investment concern and tourist service.**

1. Introduction

Bangladesh has prioritized the tourism sector in the rapid development activities of infrastructure development and formulation of Bangladesh Tourism Board (BTB) in 2010 by the virtue of Tourism Policy, 2010 expedite the development. According to the policy, a national Tourism Council formed headed by the Honorable Prime Minister of Bangladesh. As Chair of the National Tourism Council (NTC), she gave an instruction to formulate a Tourism Master Plan (TMP) for Bangladesh, setting ambitious targets for tourism to become a key driver of sustainable social and economic development and help Bangladesh become a "developed economy" by 2041, which requires an accelerated annual growth rate of 9.8% in each of the next twenty years, ahead of the 7.9% achieved in 2018. Whilst Bangladesh is home to 2.2% of the world's population, it receives 4.4% of global travel and tourism gross domestic product (GDP), ranking 171st (out of 185) in the World Travel & Tourism Council's survey in terms of relative contribution to GDP.

If the ambition for Bangladesh tourism is at the very least to achieve the world average, so that it's getting its fair share of what is arguably the world's largest industry, then by 2041 Bangladesh would:

- Almost treble employment from tourism, supporting almost 4m new jobs
- More than double tourism's contribution to GDP, adding $23bn per year
- Treble annual investment in tourism, adding $2bn per year.

The diverse stakeholder community of the three project areas like- ethnic minority groups, fisher folks, persons with disability, marginal occupational groups, adolescent mothers etc. can be benefitted through community tourism. LoGIC also aims to focus on youth between the age of 16 to 24, particularly targeting towards the rural youth population living in climate vulnerable areas, living within and outside of the LoGIC project beneficiaries. The project would facilitate youth inclusion into LoGIC supported local adaptation planning - into the various stages of the project cycle, and enhance their readiness to transform the economy and society for a climate resilient economy and society.

In the conducive scenario, LoGIC thinks ahead for the climate vulnerable communities to include in the wider tourism industry by promoting community based Eco-Tourism and thus sustaining the environment and heritage.

1.1 Working area of LoGIC

Project area covers geographically three Districts in three different Divisions of the country. Upazilas of the three Districts in three Divisions with Unions the lowest tier of local government. Detail areas of the project is shown in the below Table-1.

Table-1: Project Area

Division	District	Upazila	Union
Rangpur	Kurigram	Char Rajibpur	Char Rajibpur, Kodailkati, Mohanganj
		Roumari	Roumari, Bandabeer, Dantbhanga, Saulmari
		Chilmari	Ashtamir Char, Raniganj, Thanahat
Sylhet	Sunamganj	Tahirpur	Dakshin Sreepur, Dakshin Baradal, Uttar Sreepur, Balijhuri
		Dirai	Bhati Para, Charnar Char, Derai Sarmangal, Rafinagar
		Salla	Atgaon, Bahara, Habibpur, Sulla
		Koira	Dakshin Bedkashi, Koyra, Maheshwaripur, Uttar Bedkashi,

Division	District	Upazila	Union
Khulna	Khulna	Dacop	Banisanta, Pankhali, Kamarkhola, Sutarkhali, Tildanga
	Bagerhat	Mongla	Chandpi, Sundarban, Suniltala, Mithakhali
		Sharonkhola	Dhansagar, Khontakata, Royenda, SouthKhali
		Morelganj	Baraikhali, Jiudhara, Morrelganj, Nishan Baria

Tanguar Haor is one of the finest haor of the country that has huge potetials to develop for the domestic and foreign tourist destination. There are some ethinic groups named garo, hajong and khashia - who are lived around the wetland area. Map of the project area Tanguar Haor is shown below in Map-1.
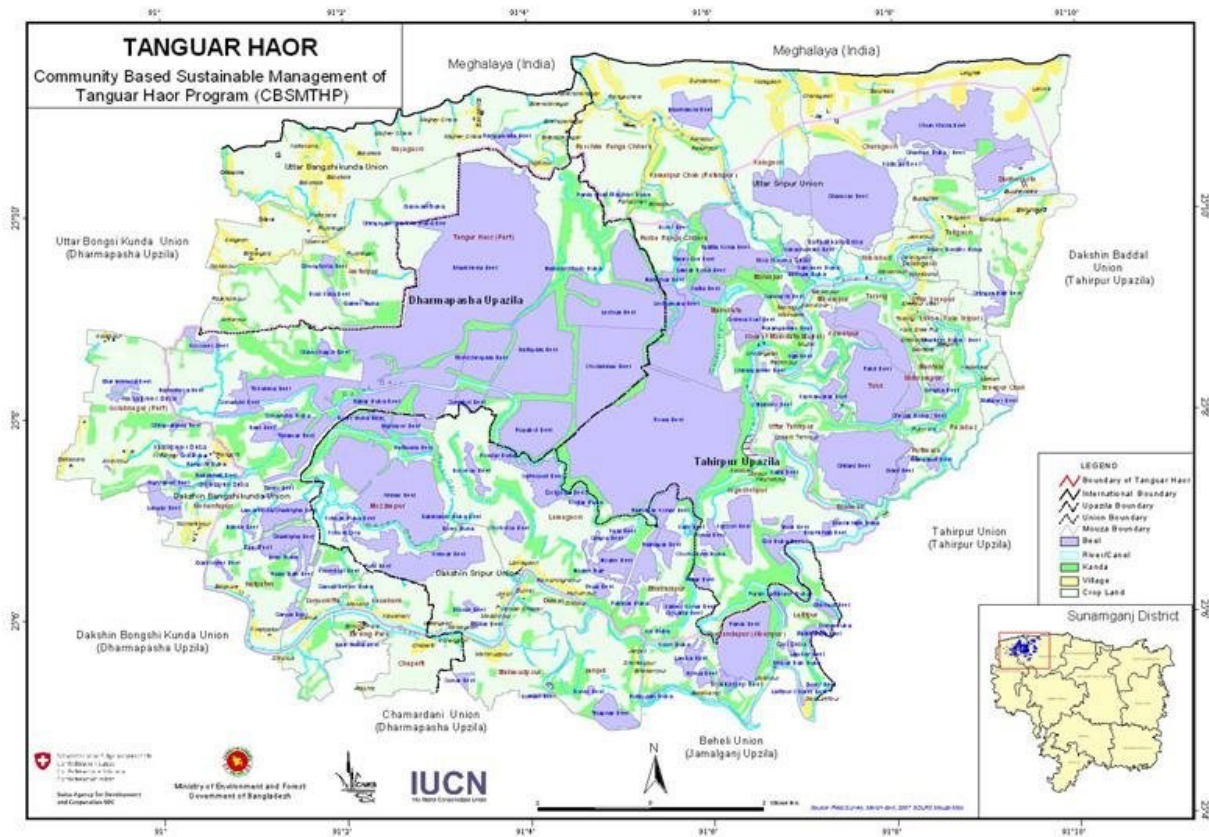
Map-1: Tanguar Haor in Sunamganj District.

Several rivers flow through the center of **Kurigram.** The major rivers are the Brahmaputra, Dharla, and Tista. Minor rivers include the Dudhkumar, Phulkuar, Gangadhar, Jinjiram, and others. The three northern upazilas of the district have recently been connected to the southern upazilas by a bridge over the Dharla river. Map of the project area of Kurigram is shown below in Map-2.

The Sundarbans Reserve Forest (SRF) is home to millions of Bangladeshis who depend on the mangroves for food, livelihoods, and protection against cyclones. The proposed activities will be focused on developing tourism in the Sundarbans where the majority of visitors enter and exit the reserve – primarily

along the Passur River and adjacent tributaries and sites along with the community depends on their livelihood on Sundarban. . Map of the project area of Sundarban is shown below in Map-3.
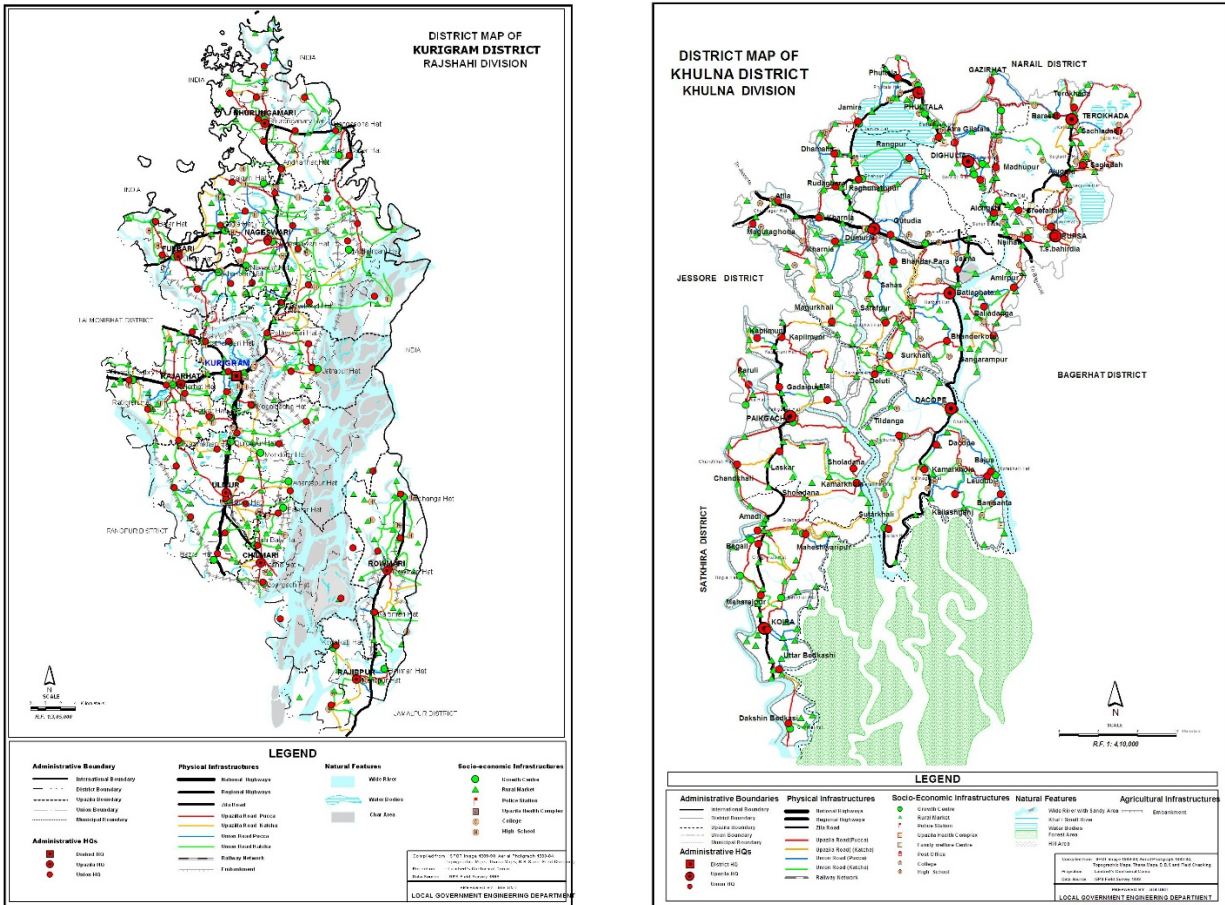
Map-2: Kurigram (left) and Khulna (right) District, Bangladesh.

1.2 Project Objectives

Main objectives of the project are –

a) Assessing the potential opportunity for Eco-Tourism in LoGIC working District with community based approach;

b) Engaging youth and marginalized ethnic communities for their adaptive livelihood in the face of climate change and disaster risks;

1.3 Scope of Work

There are three LoGIC Districts to be explored for the project. Three Districts are Khulna, Sunamganj and Kurigram under three different consecutive Divisions of Khulna, Sylhet and Rangpur. In the Rangpur Division, Kurigram is the district and Char Rajibpur, Roumari and Chilmari are the three Unions where LoGIC beneficieries are there. Similarly, in Khulna Division, Koira and Dacope Upazila under Khulna District

and in Sylhet Division, Tahirpur, Dirai and Salla upazila under Sunamganj District. Main scopes of the project are -

a) Identify potential products for community based Eco-Tourism within the three LoGIC working Districts.
b) Identifies and Priorities of three viable projects in three different LoGIC Districts.
c) Produce the Business Plan for the identified three products development.
d) Explore the alignment of potential tourism product by LoGIC beneficiaries within GoB's District level plan.

To meet the scope of work according to the ToR, consultant will visit district and upazila administration to review their development plan and scope of eco-tourism with the community and business development to cope with livelihood restoration considering climate vulnerable situation.

Table-2: Deliverables of the project

Deliverables / Outputs	Target Due Dates *indicative	days
Delivery 1: Inception report with detail work plan	2021-11-07	05
Delivery 2: Product development business plan (draft) 1	2021-12-15	07
Delivery 3: Product development business plan (draft) 2	2022-01-31	05
Delivery 4: Product development business plan (draft) 3	2022-02-23	05
Delivery 5: Final Business plan 1, 2, and 3	2022-04-26	08
Total		**30 days**

1.4 Methodology and Project approach

Project area are the three different Districts under three different Divisions. According to the nature of the scope of work, participatory approach to be taken consideration with two main stakeholders like-government stakeholders at both District and Upazila level and local community. Besides this, reviewing secondary materials on community based eco-tourism and climate vulnerability of the concern area.

1. Stakeholders mapping for identifying concern stakeholders;
2. Awareness through information dissemination among the LoGIC beneficiaries, local community, local administration, business communities and business association group (if any);
3. Secondary research materials review including project documents;
4. Questionnaire survey among the different stakeholders – tour operators, travel agents, Resorts, Hotels, Motels, Restaurants, Souvenir shops, business associations etc;
5. KII (Key Informants Interview) with the District, Upazila officials, District LoGIC officials and project coordinator along with other concern project officials in Dhaka;
6. Analysis of the qualitative and quantitative data collected from primary and secondary sources;
7. Identify the developed product and sharing with community followed by the client;
8. Develop business plan and validation with the community before sharing draft with the client;
9. Presentation on the findings of the project in the workshop/meeting with client;
10. Draft three Product Development Business plan submission;
11. Final Business Plan(s) Submission.

1.5 Work Plan

Following the participatory approach and methodology a detail work plan is required to complete the project on time. Detail Work Plan with time line is describing below Table-3:

Table-3: Work Plan of the Project

SI	Terms of Reference (ToR)	Activities	Time	Deliverables
1.	Inception Report with Work Plan	Preliminary project and literature review with ToR and Prepare Inception Report with Work Plan	5 days	Inception Report
2.	Identify potential products for community based Eco-Tourism within the three LoGIC working Districts;	1. Stakeholders mapping for identifying stakeholders 2. Awareness through information dissemination among the LoGIC beneficiaries, local community, local administration, business communities and business association group (if any);	7 Days	Product development business plan (draft) 1
3.	Identifies and Priorities of three viable projects in three different LoGIC Districts	3. Secondary research materials review including project documents; 4. Questionnaire survey among the different stakeholders – tour operators, travel agents, Resorts, Hotel, Motel, Restaurant, Souvenir shop, business association etc; 5. KII (Key Informants Interview) with the District, Upazila officials, District LoGIC officials and project coordinator along with other concern project officials in Dhaka; 6. Analysis of the qualitative and quantitative data collected from primary and secondary sources; 7. Identify the developed product and sharing with community followed by the client;	5 Days	Product development business plan (draft) 2
4.	Produce the Business Plan for the identified three products development	1. Develop business plan and validation with the community before sharing draft with the client; 2. Presentation on the findings of the project in the workshop/meeting with client; 3. Draft three Product Development Business plan submission;	5 Days	Product development business plan (draft) 3
5.	Explore the alignment of potential tourism product by LoGIC beneficiaries within GoB's District level plan.			
6.	Final Business Plan Preparation	Final Business Plan(s) preparation and Submission.	8 Days	Final Business Plan 1, 2, 3

2. Tourism in Bangladesh: Covid-19 affect

Bangladesh's travel and tourism sector – one of the industries hit the hardest by the Covid-19 pandemic – suffered a massive loss of Tk26,490 crore ($3.1 billion) last year, says a latest World Travel and Tourism Council (WTTC) report.

The WTTC's 2021 Economic Impact Report estimated that the country's travel and tourism sector accumulated a gross domestic product (GDP) of Tk 53,960 crore in 2020, which was Tk 80,450 crore in 2019. Hence, Bangladesh experienced a 32.9% decrease to the sector's contribution to the economy. Besides, over 4 lakh people involved in the country's tourism sector lost their jobs last year amid the crisis. According to the report, Bangladesh's travel and tourism industry was responsible for more than 1.86 million jobs (2.9% of total employment) in 2019. But in 2020, the number of jobs declined 21.9% to 1.45 million (2.3% of total employment.

The country's domestic travel spending saw a decrease of 33.9% – declining from Tk 68,650 crore in 2019 to Tk 45,380 crore in 2020. Meanwhile, international visitor spending in Bangladesh dropped by 59.7% in 2020 – decreasing from Tk 3,030 crore in 2019 to just Tk 1,220 crore in 2020.

Each year, the WTTC and Oxford Economics produce reports covering the economic contribution of our sector in 185 countries. The global travel & tourism sector suffered a loss of almost $4.5 trillion last year and the sector lost nearly 62 million jobs, according to the 2021 report.

2.1 Spatial Tourism Product

2.1.1 Tanguar Haor, Sunamganj

Tanguar haor is located in the Dharmapasha and Tahirpur upazilas of Sunamganj District in Bangladesh, is a unique wetland ecosystem of national importance and has come into international focus. The area of Tanguar haor including 46 villages within the haor is about 100 square kilometres (39 sq mi) of which 2,802.36 ha2 is wetland. It is the source of livelihood for more than 40,000 people. Every winter the haor is home to about 200 types of migratory birds. In 1999–2000, the government earned 7,073,184 takas as revenue just from fisheries of the haor. There are more than 140 species of fresh water fish
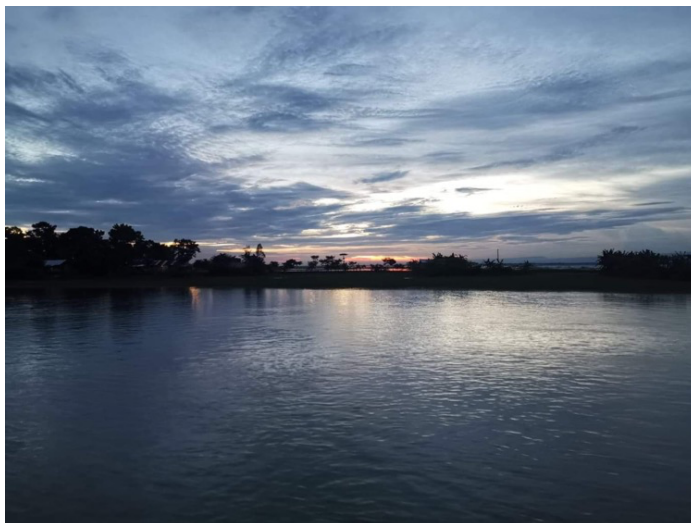
Picture-1: Sun-set at Tanguar Haor

in the haor. It has been seen on the spot that tourists are coming mainly to Tanguar Haor, Watch Tower, Shaheed Siraj Lake (Niladri Lake), Bareker Tila, Jadukata River and Shimul Bagan.

Picture-2: Watch Tower, Tanguar Haor.

Kurigram

District is located in the northern region of Bangladesh along the border of India. Its population was 2,069,273 as of the 2011 Bangladesh population census. The district is bordered by the Cooch Behar and Gaibandha districts of India to the north and east respectively, and the Lalmonirhat and Rangpur Districts of Bangladesh to the west. In total, the district has 278.28 kilometers of international border with India. The district consists of 9 upazilas, 72 unions, and 1872 villages.

Several rivers flow through the center of Kurigram. The major rivers are the *Brahmaputra, Dharla, and Tista*. Minor rivers include *the Dudhkumar, Phulkuar, Gangadhar, Jinjiram,* and others. The three northern upazilas of the district have recently been connected to the southern upazilas by a bridge over the Dharla river. Chilmari Port is located at the bank of the Brahmaputra River about 35 kilometer south from Kurigram district headquarter. Importance *Brahmaputra River* and Chilmari port is undesirable situation. Brahmaputra is
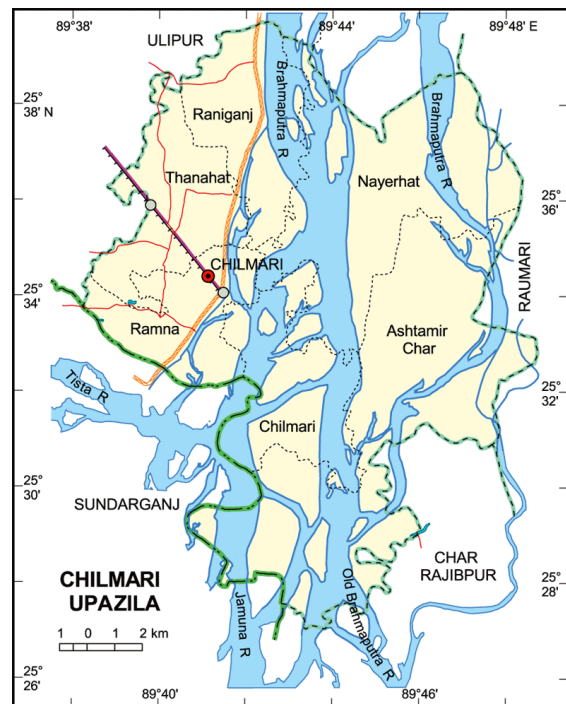
Map-3: Map of Chilmari Upazila.

8th largest river is undesirable of the world. Popular Bhaoyaila songs of Abbas Uddin about Chilmari Port is also now Folk resource of Bangladesh. In the time of British period many large ships up and down by the Brahmaputra River.

Two years before, Bangladesh Inland Water Transport Authority (BIWTA) has signed an MOU with its Indian counterpart (IWTA) for the smooth operation of India- Bangladesh river cruise - where Chilmari border and port will be the entry/exit point for a cruise from Guwahati- Dhaka- Kolkata river route that may change the livelihood scenario in and around the port area.

Picture-3: Chilmari River Port

Picture-4: Central Shahid Minar, Kurigram.

Khulna

The Sundarbans Reserve Forest (SRF) is home to millions of Bangladeshis who depend on the mangroves for food, livelihoods, and protection against cyclones. Due in part to the lack of economic opportunities, the biodiversity in the world's largest remaining protected mangrove forest is threatened by poaching, human-wildlife conflict, deforestation, oil spills, and unsustainable resource extraction.

Sustainable tourism development has been identified as a priority of the Forest Department as it presents opportunities to develop local economies dependent on the preservation of natural resources rather than their extraction, and to align the interest of protected area managers with communities and tourism industry representatives.

Picture-5: Tourists at Sundarban Forest

Picture-6: Happy faces at Sundarban Forest
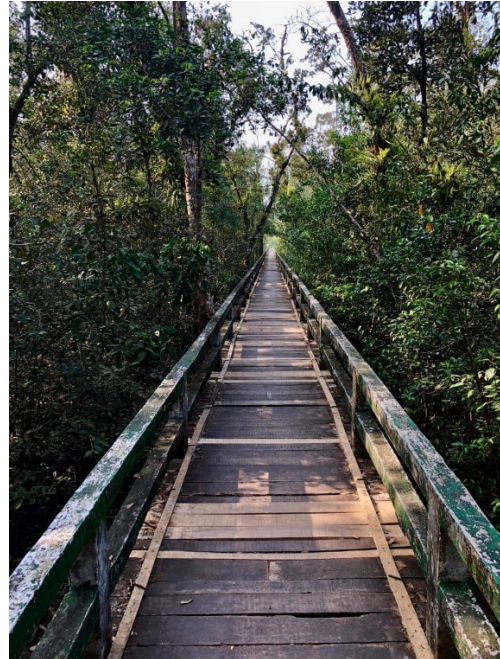
Picture-7: Walkway in the Sundarban Forest

Picture-8: Spotted Dear in the Sundarban

Picture-9: Fishermen boat in the Sundarbans

The opportunity to sail through the channels of the Sundarbans and view the incredible variety of wildlife from the largest mangrove forest in the world has been a draw for tourism to this region with the opportunity to learn more about—and possibly view—this incredible and majestic creature. Cultural experiences in the SRF are also found in the communities that live around the protected area, particularly the Hindu population.

The majority (98%) of visitors to Sundarbans Reserve Forest (SRF) are domestic, which will be critical to the success of tourism for this region as COVID-19 continues to create unprecedented challenges for the tourism industry around the globe. Domestic "Day Trippers" represent by far the largest number of visitors to the SRF and a market where additional community revenue opportunities exist. A potentially untapped market opportunity for this region also includes "SAVE" travelers—defined as those traveling for scientific, academic, volunteer and educational purposes. The total number of youth and student traveler arrivals

rose from 136 million in 2000 (20% of international arrivals) to 284 million in 2016 (23% of international arrivals). Projected arrivals were estimated to reach 300 million in 2020 (estimated prior to the global pandemic).

The proposed development alliance would focus on developing tourism in the Sundarbans where the majority of visitors enter and exit the reserve – primarily along the *Passur River* and adjacent tributaries and sites. Overnight visitation to the SRF is facilitated by boat/cruise operators that are based in both Dhaka and Khulna, but all of which use the latter as their primary boat port.

Mongla port also offers easy access to the SRF for day trips. Visitors departing from this port are almost exclusively domestic day trip visitors to the Karamjal Visitor Center with a small number also visiting Harbaria a little further into the Reserve. Upwards of 70 local boats carry 30-50 people the 5.5 km / 3.5 mi distance between Mongla and Karamjal.

2.2 Climate vulnerability and tourism

Bangladesh is one of the most vulnerable country to the impact of climate change. So, the country is facing severe impact on climate change and climatic migration is increasing day by day through the increasing of the cluster area in the city area for searching job. Aged people, women, children, marginalized people along with the ethnic group of people are the most affected community from the changed situation due to climate. Eco-tourism might be the strategy to adopt the changed situation living in and around their livelihood as the livelihood is becoming threat to the impact of climate change for their dependency on the nature like- forest, wetland, hilly terrain etc. Households can present opportunities for livelihood diversification and sustenance. Now, in many parts of the world considering ecotourism as livelihood diversification because it complements livelihood assets and activities

2.2.1 Community based Eco-Tourism

Eco-tourism is an emerging idea to give tourists a place to enjoy the first hand idea of village home stay. It is an opportunity to know the actual taste of village life and different types of village culture with the help of local community. Ecotourism focuses on the improvement of natural eco-systems through tourism. The International Ecotourism Society (TIES) defines ecotourism as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people and involves community with their activities. Ecotourism thus involves environment-friendly support for local livelihood diversification and nature conservation sustainability. Ecotourism can also contribute to increasing sustainable productivity, infrastructure development in remote areas and boosting the employment rate in local communities. Local community plays a vital role to develop a tourism. A community is a social part that shares common values. The word is often used to refer to a group that is organized around common values and is imputed with social connection within a shared geographical location. The word can also refer to the national community or global community. In human communities, intent, belief, resources, preferences, needs, risks, and a number of other conditions may be present and common, affecting the identity of the participants and their degree of cohesiveness.

Tourism is a rapidly growing sector in Bangladesh, as well as over the world. Community based Tourism is a form of tourism program that allows visitor to get acquainted with the rural areas & local families to better learn the local lifestyle, its culture and cuisine. Community based Eco-Tourism program offers a unique opportunity for the tourists in experiencing local way of life in its raw form. Through this program, tourists get more access to the host culture by interacting more with locals and regular activities of their daily life, which is very difficult obtaining through any other form of tourism.

Benefit for Community

Local people benefit through additional income, new skills and knowledge, and a healthy environment. Community Based Tourism directly increases the confidence and capacity of local people to negotiate a better deal from development. This approach emphasizes the 'community' as the focal point. It emphasizes on local input and control over the type, scale, and intensity of tourism development. Similar to other community initiatives, CBT highlights the importance of community capacity building, empowerment and 'ownership' in tourism development as a means to sustain the community growth and development.

2.2.2 Community Engagement

Our first task would be to make the community aware of the project, its economic benefits for them and the importance of their social position. This community engagement program would be bi-folded. In one hand we would go through Government channel to the representatives of the villages so that respective bodies in the Government as well as the village leaders and politicians are well aware about the activities. Secondly we would organize different community programs that will be accompanied with several influential figures from different aspects of our life.

These programs would unite the village leaders, politicians, community members and members in the local government bodies with the project and make them feel important so that they are more aware and cooperate the local beneficiaries.

Community engagement could be involved through the following activities before starting any business activities locally:

A. Train them to provide required standard service - Sanitation, Hygiene, Cleanliness, Safety, F&B standardization, and language;
B. Train local youths for guiding tourists;
C. Update the facilities regularly;
D. Assist villagers in producing local handicraft materials and install shop to sell them;
E. How to prepare organic vegetables and fruits through certification from the local authority;
F. Housekeeping to make congenial environment

Eco-tourism consultant has experienced to train community based eco-tourism and homestays programme organized by Bangladesh Tourism Board at Paharpur, Naogaon District back in 2016. Few selected pictures are given below:

Picture-10: Community based Eco tourism training (left pic) Homestay signboard at Paharpur (right one).

3. Business Plan

The basic idea of Community based Tourism is to provide a clean and affordable place for foreigners and domestic tourists alike including an opportunity for foreign tourists to stay with Bangladeshi communities/families to experience our customs and traditions and relish authentic Bangladeshi culture and cuisine. Home stay units, once introduce will be duly publicized. A directory of all such approved establishment will also be prepaid, so as to enable tourists to live in a homely environment and to take advantage of the scheme. In addition, sufficient training in hospitality/tourism trade would opt for owning such facilities to adopt themselves being a part of the eco-tourism.

Objectives of eco-tourism:

- To identify the local culture and value;
- To identify the community involvement;
- Maintaining the Sanctity of the Environment
- Provide positive experiences for both visitors and hosts.
- Build environmental and cultural awareness and respect.
- Raise sensitivity to host peoples' political, environmental, and social climate.
- Utilizing All Types of Resources Efficiently
- Preserving the Biological Diversity
- Ensuring the Economic Progress of rural villagers

Perspective of Eco-tourism:

1. Major Tourist Attraction within the local community
2. Promotion of Local Economy including agriculture
3. Appreciation of socio-cultural values and norms
4. Protection of Environment and Biodiversity
5. Sustainable Community Development

The beneficiaries can form one/several **Co-operative society** among the interested households and start running a Homestay projects- where interested tourist can stay and enjoy the local culture & cuisine. Or alternatively, they can invest to establish a local food restaurant or a souvenir/ handicraft shop or provide local transportation for the visiting tourists or prepare an eco-tourism spots – where tourists can visit and enjoy. The idea is to earn some additional income other than their usual profession.

For the financial help, any local NGO can finance their financial need as per the project or local Bank or financial institutions also can be a part of their projects.

3.1 Institutional approach

District and Upazila administration can be a top part of the institutional tree to develop a facilitating structure for the community tourism as they are the working hand for the Bangladesh Tourism Board (BTB) at ground. They might arrange capacity building of a group of community those are interested to participate actively in the community based eco-tourism. Administration can facilitate the community by ensuring safety & security, arranging institutional link with tourist and providing services to the community to increase the growth of the upazila/District and the country as a whole.

3.3 Safety and Security

In 2013, Government has formulated Tourist Police policy and established a regular Tourist Police force in the country for the safety & security of tourists from home and abroad. Now a days, Tourist Police are posted almost all the important tourist places in the country including Sylhet, Rangpur and Khulna division. So for the security and safety of the tourists, Tourist Police will be the primary source of safety.

Secondly in each district, there are district police force- who is also looking after the safety and security of the visiting tourists if needed.

And thirdly, we suggest in each community to protect their own security and safety, the community leaders would form a local community forum by which they will establish and safe guarding a private safety and security group from the community to protect & look after the visiting tourist in their territory.

3.4 Investment concern and Tourist service

If a local beneficiary want to enhance the tourism services in his territory than they need financial support. For example, if anybody want to make a hygienic toilet or open up a restaurant for tourists or buy a local transportation for tourists use or setting up a handicraft or souvenir shops with the local handicraft items needs finance. This finance could derived from the co-operative society that they formed earlier.

Alternatively, the local NGO or any local Bank or financial institutions also can play a vital role to release the funds as per the projects or beneficiary needs.

The local districts and upazilla administrations also can validate and liaison between the local beneficiaries with the funding agencies, so that the financial institutions can trust them and conveniently release the fund as per their need.

Lastly the local business chamber group or business associations also can come forward to recognize the each local beneficiaries, so that financial agencies has no doubt for their finance return and both the parties can work with full of confidence and trust.

4. Conclusion

The tourism industry is frequently referenced in Bangladesh as a highly important stakeholder/user group with the potential to provide extensive benefits to the local economy of destination areas. However, there is no consistent analysis of tourism's impacts on the ecosystem or neighboring communities. The purpose of this research to involve community in tourism industry. Trained how to preserved natural environment and sustainability. It may generate a significant flow of money within the community through different avenues, for example, handicrafts manufacturing, providing home stay, start a transportation service for tourist use, open up a restaurant for tourist etc. Exploration of potential rural tourism destinations is essentially needed in 3 different districts of LoGIC area to provide increased access of the poor in this sector. Benefits of tourism are to be directed to the beneficiaries either through training and employment provision or tourism related micro and small entrepreneurial support. If a sufficient proportion of people are employed, there may be a social change and the conservation of this valuable resource may be initiated and facilitated. But, lack of knowledge amongst the community regarding tourism development is a problem in CBT in Bangladesh. Again, to be involved in a sophisticated industry like tourism necessary training and education is mandatory. Networking among the tourism and related stakeholders is another issue that needs to be considered. Lastly, it is mainly the government institutions- which has to come forward with a determination and commitment to alleviate the lifestyle of our poverty stricken but highly hospitable communities having rich cultural and craftsmanship tradition by utilizing the community based tourism.

4.1 Conclusion and Recommendation

Qualitative and quantitative analysis of the primary (if any) and secondary information from the project may allow us design the eco-tourism business strategy for the community especially the vulnerable community group. Outcome will be analyzed and business design be prepared based on the outcome of the business model to enhance the eco-friendly community livelihood.

Potential outcome of the project:

- Both the tourists and the villages are benefitted by this initiative: eco-tourism
- The tourists find solitude in a rural setting
- Project beneficiaries / villagers are provided with financial support from the tourists
- Exchanging cultural norm, values and behavior
- Earn some additional income other than their usual profession for a better livelihood.

Inception Report

"Climatic Vulnerability Index"
(Mapping for the Local Government Institutions (LGI),
Pouroshava, and City Corporations in Bangladesh)

Submitted to

United Nations Development Programme (UNDP)
IDB Bhaban, Begum Rokeya Sarani,
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Inception Report

"Climatic Vulnerability Index"
(Mapping for the Local Government Institutions (LGI), Pouroshava, and City Corporations in Bangladesh)

1.0   Background

There has been an increasing tendency of policy activities and development activities on reducing risk from climate-induced natural disasters globally and locally. Bangladesh is highly vulnerable to the adverse impacts of extreme climate events with floods, tropical cyclones, tornadoes, storm surges, droughts, and so on. In addition, the country is experiencing rainfall variability, riverbank and coastal erosion, saline-water intrusion, and many other natural disasters every year. Changes in intensity and frequency of extreme weather events as well as deviations from average weather are affecting annual development programs in different geo-physical areas of the country.

The United Nations Development Program (UNDP) is planning to establish a mapping system for climate vulnerability index (CVI) in Bangladesh up to the union level. This CVI mapping will be helpful in formulating budgetary provision for the annual development of the union level administration. In addition, the CVI map data can easily identify the overall pattern of climate vulnerability in different corners of this country from rural to urban settings. Most of the LGI are unable to continue their development programs since to spending almost all the development budget to cope with the climate-induced disasters. Therefore, an annual development budgetary provision in considering with climate-induced disasters should be crucial in the development strategy.

The assessment of climate vulnerability is still with multiple limitations. The methods for vulnerability assessment are changing continuously and they are not in the uniform concept. In Bangladesh, there are a few studies on vulnerability assessment at large scales, mainly for districts with equal vulnerability component weights. Therefore, the results are confusing as the vulnerability component weights differ significantly. In this study, it is the intention of the UNDP to produce CVI mapping up to the lower administrative tier e.g., Local Government Institutions (LGI) as well as Pouroshava (Municipality), and City Corporations.

The Government of Bangladesh is giving priorities for the grassroot level development through LGI. Therefore, the CVI map data will be helpful in assessing budgetary provision as well as formulation of policies for improving the socioeconomic conditions of the people of this country. High vulnerability areas can

be identified and interpreted as areas/unions that should be prioritized for infrastructural development, adaptation, or maintenance. This will help to the GOB for developing a national level database regarding climate-induced hazard exposer and sensitivity as well as adaptive capacity. Policy makers and development partners can utilize this database for achieving different Sustainable Development Goals.

2.0 Climate Vulnerability and Bangladesh Situation

Climate induced disasters are thought to be the major obstacle to development in many countries (Collins 2009). Climate change can influence disaster risks in two ways: firstly, through increases in weather and climate hazards, and secondly through increases in the vulnerability of communities, particularly where people are economically poor and exposed to natural hazards (Béné et al. 2014; Blakie et al., 1994; IPCC 2014; O'Brien et al. 2008). Apart from projected extreme climatic events of the future, many changes are already being observed indicating adverse impacts on both natural and human systems (IPCC 2014; UNISDR 2013).

Bangladesh is one of the most vulnerable countries to both disasters and climate change. The country has a good track record of disaster management with climate change into account. Most development projects in the country address reducing vulnerability to disasters or poverty, and it is well recorded how local people have their own well established coping capacities. Tropical cyclones, tornadoes, floods, coastal and riverbank erosion, droughts, landslides are the major climate-induced hazards in Bangladesh. Bangladesh is ranked the seventh extreme disaster risk-prone country in the world as per the report from the Global Climate Risk Index (Eckstein et al., 2021). Changes in climate trends with variability and extreme events in Bangladesh including temperature increase, increase of annual mean rainfall, frequent severe floods, intensity of cyclones, frequency of monsoon depressions, salinity in coastal areas are the priority issues in the development aspects of this country. The current situation predicted that by the mid of this century, this country could lose nearly one-fifth of its land (Lázár et al., 2020; Steckler et al., 2021) and nearly a million (De Lellis et al., 2021) coastal people would be displaced due to the present rate of sea level rise. The figure could be increased to nearly five million by the end of this century (Bell et al., 2021).

The Bay of Bengal registers about 7% of the major cyclones of the world (Debe et al., 1997) and the frequency of high to very high intensity cyclones has increased between 20% to 26% between 1877 to 2005 (Singh 2007). Intense cyclones such as Sidr occurred in 2007, Aila in 2009, Bulbul in 2019, Amphan in 2020 as well as severe floods have caused massive devastation to coastal regions (Das et al., 2020: Nur et al., 2021). Bangladesh has a very long history of tropical cyclones that caused the coastal area destruction, loss of human lives, and extensive property damages (Alam et al. 2020). About 500,000 and 140,000 people have lost their lives by two notable tropical cyclones that made landfall in the coastal areas of Bangladesh in 1970 and 1991, respectively (Alam and Dominey-Howes 2015;

Sattar and Cheung 2019). Cyclone Sidr that occurred in 2007 killed more than 3,500 people and incurred around $1.67 billion US dollars' worth of economic loss (Alam et al. 2020). Cyclone Aila that made landfall in 2009 caused 190 deaths, injured 7000 people, and destroyed more than half a million houses (Ahmed et al. 2016). Due to low-lying coastal regions, many people will be at risk under the scenario of storm surges with future sea-level rise (Mullick et al. 2019).

Cyclone Amphan, which made landfall by May of 2020, has barrelled through the western coastal districts in Bangladesh at wind speeds of up to 190 km/h and heavy rains, destroyed the river embankment across the Sundarban which has led to saltwater entering the land (Das et al., 2020). Home dwellings and infrastructure rebuilt after cyclones Sidr and Aila have been lost due to the most recent cyclone. In the aftermath of the cyclone, it is estimated several hundreds of thousands of people are still triggering a wave of human migration from coastal belts. The vulnerability of tropical cyclone is a big concern (Alam and Dominey-Howes 2015; Sahoo and Bhaskaran 2018). The future climate change scenarios mainly the sea-level rise may accelerate the tropical cyclonic vulnerability to a greater extent (Appelquist and Balstrøm 2015; Moon et al. 2019).

Drought is one of the most complicated and recurring extreme climatic disasters in Bangladesh (Salam et al., 2021a; Uddin et al. 2020; Zhang et al. 2019). Drought is one of the major threats to reduce crop production in Bangladesh (Ahmed et al. 2019) due to extreme temperature and low rainfall and significant change of local climate change in recent times (Mardy et al. 2018; Zinat et al. 2020). These disasters affect millions of people and causes tremendous environmental degradation, loss crop production, livelihood problems, social crisis, economic disruption, and loss of lives (Islam et al. 2017; Islam and Khan 2018; Salam et al. 2021b; Tasnuva et al. 2020).

A plethora of literature from Bangladesh aspects have been concentrated on the drought effects on many sectors, more specifically on agriculture (Habiba et al. 2012; Rahman et al. 2018), food production (Ericksen et al. 1993), economy, and society (Ferdous and Mallick 2019). Habiba et al. (2012) assessed people's perception and adaptation plans to cope with drought in the North-west part of Bangladesh. Salam et al (2021) explained the perceived and actual risks from drought from lower Teesta River Basin in the northern part of Bangladesh. Few studies exist in some other areas in Bangladesh about drought impacts and adaptations (Islam et al., 2020; Mardy et al. 2018; Shahid 2010) and climate change and agricultural adaptation (Habiba and Abedin, 2021).

Bangladesh is considered a highly **tropical cyclone-prone** country, the studies related to tropical cyclonic vulnerability are linked to the assessment of tropical cyclone risk (Alam et al. 2020; Hoque et al. 2021; Quader et al. 2017; Sattar and Cheung 2019), vulnerability pattern (Alam and Collins 2010; Hossain 2015), impacts and adaptation (Mallick et al. 2017) in coastal Bangladesh. Hoque et al. (2018) developed a tropical cyclone model using multi-criteria approach at a local-scale. Mallick et al. (2017) conducted a study to evaluate the coastal communities'

adaptation, recovery, and preparedness to tropical cyclone impacts in some coastal villages of the south-western coast of Bangladesh. Quader et al. (2017) mapped the risk to human lives and livelihoods for the coastal areas of Bangladesh using limited criteria, largely focusing on social aspects. Hossain (2015) analysed the vulnerability to tropical cyclone impacts at the household level using the qualitative data from western coastal regions of Bangladesh. Alam et al. (2020) performed assessing risk from tropical cyclones on the eastern coast of Bangladesh using geospatial techniques. Vulnerability assessment by integrating sufficient criteria of vulnerability elements, such as physical, social, and mitigation capacities, is essential to generate detailed and authentic vulnerability information (Rashid 2013).

More than four-fifth of the area in Bangladesh are recognized as crops producing regions. To cope with the detrimental impacts of floods, cyclones, drought and other extreme climatic events on crop production, it is needed to aware people about the hazard and risk from different natural and climatic events to ensure disaster-resistant (e.g., drought-resistant, saline-resistant) agricultural system for food security as well as the livelihood security. In addition, disaster preparedness and mitigation strategies will reduce risks from different climatic extremes and natural disasters. Therefore, could minimize the losses and thus make a climate-induced disaster-resilient society.

3.0   Conceptual Framework and Literature Review

The concept of vulnerability originated from the social sciences in response to the hazard oriented perception of disaster risk over half a century which is still a controversial concept. The concept of vulnerability has been applied in different ways by different organizations such as the Intergovernmental Panel on Climate Change (IPCC), United Nations Development Program (UNDP), Organization for Economic Cooperation and Development (OECD), the Red Cross, and others (Duong et al., 2017). In 2007, IPCC defines vulnerability can be defined as

> "The degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with, adverse impacts of climate change, including climate variability and extremes" (IPCC 2007, p.783).

In 2009, UNISDR conceptualised vulnerability as:

> "The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard" (UNISDR, 2009).

UNISDR also noticed that vulnerability can be characterized as the extent of the susceptibility of the people, resources, and environments to the impacts of

particular hazards which is determined by physical, social, economic, and environmental criteria (UNISDR 2009).

Vulnerability, in the context of climate change, is the degree to which a system is unable to manage the harmful effects deriving from climate and environmental stress (Macchi et al. 2011). One important dimension of vulnerability is the physical risks that result from climate stresses (Eriksen and O'Brien 2007). These stresses are likely to include increased temperature, changing pattern of precipitation, and changes in frequency and intensity of extreme events. However, the most satisfactory concept of vulnerability in relation to the field of climate change is:

> " . . . Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity" (IPCC, 2001).

Therefore, vulnerability can be formulated as a function of three factors which are exposure (E), Sensitivity (S), and Adaptive Capacity (AC):

$$V = f\left(E, S, AC\right)$$

Exposure is the magnitude and duration of the climate-related stress such as a drought or change in precipitatio; sensitivity is the degree to which a system is affected by the climate related stress or extreme events; and adaptive capacity refers to the system's ability to withstand or recover from the extreme events/damage (Duong et al., 2017; Ebi et al., 2006; Hahn et al., 2009; Schneider et al., 2007).

The term "vulnerability" in the Fourth Assessment Report (AR4) is used to refer to the vulnerable system itself (e.g., low-lying islands or coastal cities) and the impact to this system (e.g., flooding of coastal cities and agricultural lands) (Schneider et al., 2007). Climate change with climate variability and extreme climatic events can directly and indirectly impact on the environment, socioeconomic sectors, agriculture, food security, human health, biodiversity and so on. Cropping intensity has already been affected adversely by increasing temperature, changes in precipitation, and the extreme events associated with climate variability (Das et al., 2020; Hahn et al., 2009; Pathak et al., 2018). Furthermore, climate change has the potential to reduce crop yields by increasing soil salinity (Teh & Koh 2016; Tomaz et al., 2020).

There are various aspects of vulnerability that are being arose from physical, socioeconomic, and environmental factors. However, vulnerability varies significantly within a community and over time. There is a plethora of literature regarding the vulnerability of different environmental settings in different space-time dimensions. Some literatures are related to the conceptual and methodological issues of climate vulnerability and risk as well as their assessment and adaptation planning (Hinkel 2011; Joakim et al. 2015; Malone and Engle 2011; Preston et al. 2011). Some are linked to different indicators (Luers et al. 2003; Rod et al. 2015;

Tonmoy et al. 2014). The sustainable livelihood framework of Hahn et al. (2009) consisting of different indicators which are used to analyze the vulnerability of sub-components and the overall vulnerability (Etwire et al. 2013; Pandey and Jha 2012). Sustainable livelihood framework of Hahn et al. (2009) tries to integrate the interaction between the human being and its social and physical environment. The other is the IPCC framework approach which includes exposure, sensitivity and adaptive capacity as three major factors of vulnerability (Sisay 2016). Another set of literature investigated the drivers and context of vulnerability (Morss et al. 2011; O'Brien et al. 2007). A significant number of literatures emphasize on the adaptation and resilience building strategies for reducing vulnerability and maintaining sustainable development (Brooks et al. 2005; Fussel 2007; Hinkel 2011; Swart et al. 2003; Yohe et al. 2007). Moreover, there are some literatures that focused on climate vulnerability at micro-level (e.g., Mohammed et al., 2014; Nkondze et al., 2013; Opiyo et al., 2014; Piya et al., 2019), some are centered to livelihood vulnerability index (e.g., Adu et al., 2017; Koirala, 2015; Shah et al., 2013; Sisay, 2016; Tuy and Anh, 2021; Yu et al., 2021), and some vulnerability analyses are linked to poverty at the household level (Jha et al., 2010; Imai et al. 2010; McCulloch & Alandrino, 2003; Zhang & Wan, 2006).

The UNFCCC Secretariat, in 2008, developed a compendium of methods and tools to evaluate vulnerability and provided a chronological development of vulnerability assessment approaches and methodologies (UNFCCC Secretariat 2008). It was observed that the first generation methodologies focused mainly on impacts of climate change than on adaptation and mitigation as well as the stabilization of greenhouse gas concentrations. Some studies applied to climate scenarios based on general circulation models (GCM) to ecosystem models to assess climate impacts on bio-geophysical environments. Some studies went a step further by assessing the impacts on economic sectors (e.g., agriculture, forestry, water resource management). Later, climate scenarios were complemented by the inclusion of socioeconomic scenarios (Das et al., 2020). The subsequent methods linked adaptation with current climate variability and vulnerability in addition to future climate and vulnerability, broadening the scope to other environmental, economic and social stressors. Methodologies are rapidly evolving, and recent approaches include aspects such as adaptation policies and measures or adaptive capacity (Malak et al., 2017).

Vulnerability encompasses a variety of concepts including sensitivity or susceptibility to harm and lack of capacity to cope and adapt. A broad set of factors such as wealth, social status, and gender determine vulnerability and exposure to climate-related risk (IPCC 2014). Several factors influence the level of vulnerability assessment perception such as gender, educational status, livelihood options, income, perception of the calamities, intensity and magnitude of the hazards, degree of economic and structural losses, availability of resources, etc (Rana and Routray, 2018; Sattar and Cheung, 2019, Salam et al. 2021a). Addressing vulnerability to climate change is the major challenge to sustainable development in the 21st century. Therefore, it is important to include vulnerability assessments

in the context of multiple stressors, vulnerability mapping, and local-level case studies across the country.

4.0 Goal

The main goal of the study is to prepare Climate Vulnerability Index (CVI) and mapping up to the Local Government Institutions (LGI) level (e.g., Union, Pouroshava, and City Corporation).

5.0 Objectives

The main objectives of the study will fulfil the assigned goal. They are as follows:

(a) Develop a quantitative mathematical climate vulnerability index methodology based on downscaling climate data and secondary data (social, environmental, economic).

(b) Downscale the climatic data, preferably the Regional Circular Models (RCMs) at district / sub-district / union / municipalities / city corporation level.

(c) Analyze the CVI following the climatic events, exposure, sensitivity, and adaptive capacity up to the union / municipalities / city corporation level; and

(d) Prepare maps for CVI to figure out areas with high vulnerability and low vulnerability zones.

6.0 Scope of Works

The main work will be to prepare spatial maps showing the CVI for Unions, City Corporations, and Pouroshavas in Bangladesh. In addition, a comprehensive report is the prerequisite for this study. The work to be undertaken will be based on several specifications:

- Review of existing literature concerning to the relevant information of this study.

- Associated information to be collected from different secondary sources, e.g., Bangladesh Bureau of Statistics (BBS), Bangladesh Meteorological Department (BMD), Bangladesh Space Research and Remote Sensing

Organization (SPARRSO), Survey of Bangladesh (SoB), Water Resource Planning Organization (WARPO), Bangladesh Water Development Board (BWDB), Flood Forecasting Warning Centre (FFWC), Cyclone Preparedness Programme (CPP), Local Government Engineering Department (LGED), Local Government Division (LGD), department of Public Health Engineering (DPHE), Department of Agricultural Extension (DAE), Soil Resource and Development Institution (SRDI) and so on.

▪ Spatial data (including DRIP, NAP/CCIKM, Geo-Dashboard, Bangladesh Meteorological Department-BMD, Space Research and Remote Sensing Organization-SPARRSO) to be utilized for mapping.

▪ Analysis the current climate scenario following the existing climatic data from the BMD.

▪ Assessment of the changing pattern of climate in different time slices, e.g., 2030, 2050, and 2100.

▪ Investigation of extreme climatic events with historical data.

▪ Collect socioeconomic data for each union from BBS and LGD.

▪ Use of GIS software (mainly the ArcGIS 10x) for spatial CVI mapping.

▪ Analyze the pattern of exposure of climate-induced natural events.

▪ Analyzing CVI with existing methodology considering exposure, sensitivity, and adaptive capacity. All information will be against each union, municipalities, and city corporation.

▪ Consultation with national level hazard exposures and vulnerability data with the information published in different reports and academic published research papers.

7.0   Data and Methods

The design for this study is composed mainly of problem formulation, relevant available data and their quality, data manipulation, data analysis and interpretation, as well as performing geospatial analyses with a GIS output. The investigation of CVI employed multi-method approach (Figure 1.0). This strategy provided a mix of spatial, quantitative, and qualitative data. In-depth interviews from community and FGD sessions from selected LGI in different geophysical areas in Bangladesh will be deployed. The methods allow a greater depth of understanding of the pattern of vulnerability and community and human responses to it.

Literature and Background Study for Climate Vulnerability Index

Identification of Research Gap: Who has done what? Where is the gap? This means the missing phenomena in CVI in the context of Bangladesh

Scope Identification

Relevant Data for CVI analysis for the LGI, City Corporations, and Pourashava

Relevant Data and its Nature

The climate stressors will be analyzed with daily climatic data, mainly the minimum and maximum temperature as well as pattern of rainfall. In addition, current data for climatic events will be deployed for CVI

Exposure	Sensitivity	Adaptive Capacity
▪ Climate Variability ▪ Climate Stressor ▪ Climatic Events	▪ Natural Capital ▪ Infrastructure ▪ Access to Health ▪ WASH ▪ Livelihood	▪ Socio-demography ▪ Livelihood ▪ Crop Production ▪ Technology ▪ Social Network

The sensitivity data as well as the information of adaptive capacity will be categorized and utilized analysis of CVI

Data Sources and its Input

Spatial Data	Spatial Files	Climatic Data	Non-spatial Data
▪ Survey of Bangladesh ▪ Local Government Engineering Department ▪ Local Government Division ▪ Centre of Environmental GIS ▪ Soil Resource and Development Institution	▪ Toposheet ▪ Satellite Imageries	▪ Bangladesh Meteorological Department ▪ Bangladesh Space Research and Remote Sensing Organization ▪ Flood Forecasting Warning Centre ▪ Cyclone Preparedness Programme	▪ Bangladesh Bureau of Statistics ▪ Water Resource Planning Organization ▪ Bangladesh Water Development Board ▪ Department of Public Health Engineering ▪ Department of Agricultural Extension ▪ Soil Resource and Development Institution

Data Editing and Management

The BMD provided climate data will be used with 5 arc-minutes (10 x 10 km) downscaling results. In addition, the projection for the climatic situation in different time slices will be calculated

Downscaling of Climate	Spatial Processing	Non-spatial Cleaning
▪ Spatial resolution of 5 arc-minutes. ▪ Projection for different time slices, e.g., 2030, 2050, and 2100.	▪ Data Editing ▪ Data Cleaning ▪ Data Building ▪ Data Transformation	▪ Missing Data ▪ Data Error Investigation ▪ Error Minimization ▪ Data Merging

The spatial data is high erroneous, and we will minimize the error level as well as it is needed to check the non-spatial data quality before going to analyze CVI.

Data Analysis for CVI

The relevant exposure pattern will be calculated based on the stressors of climatic variables and its potential impacts will be utilized.

$$CVI = \frac{(E + S) + (1 - AC)}{3}$$

Where,
E = Exposure, S = Sensitivity, and AC = Adaptive Capacity

The potential impact will be calculated with analyzed with sensitivity and adaptive capacity.

Feedback of CVI data from the UNDP

Data Output

The map output will mainly be focused on CVI maps, it can be based on several thematic features. In addition, perspective maps apart from Cartography, some "mental maps" in geographical perspectives and "social maps" in sociological perspectives will be used. Moreover, different interpretive maps will be produced for proper CVI reflection.

Displaying Map Output	Tabular & Statistical Output
▪ Composite map ▪ Perspective map ▪ Interpretive map	▪ Area ▪ Length ▪ Data Summary ▪ Graphics

The tabular and statistical data will be focused on area of each LGI, City Corporations, and Pourashava; the length of roads and other land-base and facility-based information. The data summary along with descriptive statistics and graphics will be displayed.

Draft Report

Feedback of CVI report from the UNDP
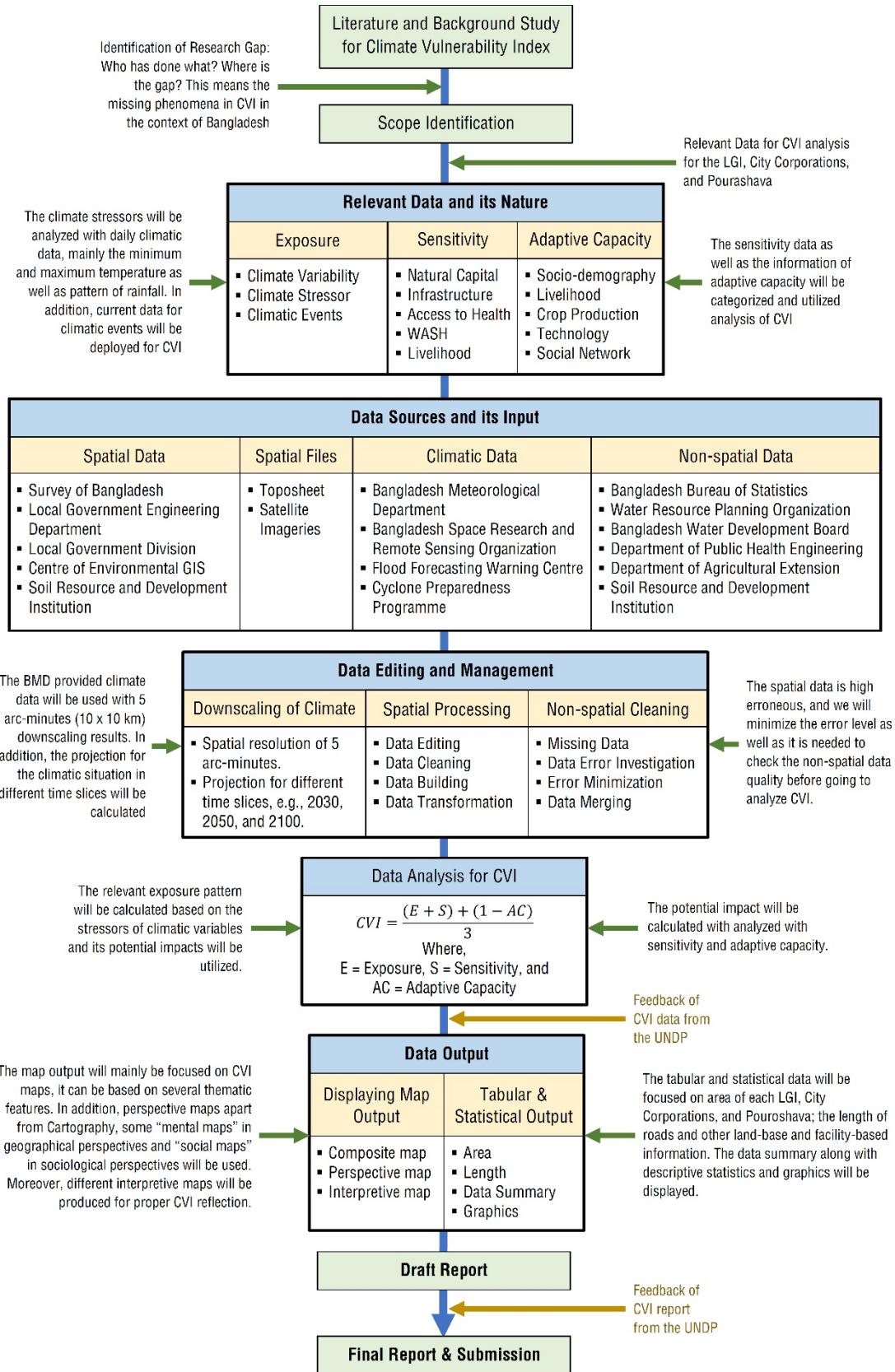
Final Report & Submission

Figure 1.0:
Flow diagram for relevant data and methods to be applied for CVI analysis

7.1 Data Sources and Collection

The relevant data will mainly be collected from the secondary sources. There are three different types of data, e.g., climatic data, sensitivity information, and adaptive capacity (Table 1). In addition, the database can be categorized with spatial, quantitative, and qualitative data.

7.1.1 Spatial Data

The spatial data in terms of point, line, and polygon are prerequisite for this study. Moreover, land-base and facility-based information in the form of spatial data will be utilized for CVI mapping. It is noted that the administrative data up to the union level will be collected from different secondary sources. They are:

- Survey of Bangladesh (SoB),
- Local Government Engineering Department (LGED),
- Local Government Division (LGD),
- Centre for Environmental GIS (CEGIS), and so on.

Nevertheless, information about geophysical information, soil classification, digital elevation with topography, arable lands with cropping intensity, water flow data, hydrological data, cyclone shelter information in coastal areas and so on are required for this study. In addition, topographic map and satellite imageries will be required for this study. They will be collected from some organizations. They are:

- Survey of Bangladesh (SoB),
- Bangladesh Bureau of Statistics (BBS),
- Soil Resource and Development Institution (SRDI),
- Department of Agricultural Extension (DAE),
- Water Resource Planning Organization (WARPO),
- Bangladesh Water Development Board (BWDB), and so on.

It is noted that

7.1.2 Climate Data

The relevant atmospheric characteristics in terms of climate data will be required for CVI mapping. It is noted that are many online based geospatial sources for climate data ranging from GCM to RCM calculated from different historical database with a number downscaling and modelling systems. It is noted that atmospheric characteristics collected from local meteorological stations would be suitable for CVI analysis. Accordingly, the climatic data will be collected from Bangladesh Meteorological Department (BMD). The data will be based on 1991 to 2020 (30 years) information to analysis climate change in different time slices.

Table 1:
Selected CVI components and indicators

CVI Components	Main Indicators	Indicators	Data Source
▪ Exposure	▪ Climate Data	▪ Climatic Variability: Average Maximum Temperature (°C), Average Minimum Temperature (°C), Average Monthly Precipitation (mm)	BMD
		▪ Climate Events (Floods, Droughts, and Cyclones)	BMD
▪ Sensitivity	▪ Demography	▪ Population (total, male and female, population density)	BBS
		▪ Age group (male and female): 0-14 children, 14-19 adolescent, 20-59 adult, and ≥60 senior citizen	BBS
		▪ Households (total households in number and average size of household)	BBS
		▪ Marital Status (male and female): Unmarried (%), Married (%), Widowed (%), and Divorce/Separated (%)	BBS
	▪ Infrastructure	▪ Housing Characteristics (frequency or %): Building, Semi-metallic, Shanty/hut, Jhupri, Slum	BBS, LGED,
	▪ Connectivity	▪ Road network (length in kms): Total, Metallic, Semi-metallic, Earthen,	LGED, SOB,
		▪ River network (total length in kms)	BWDB,
		▪ Railway network (total length in kms)	BR
	▪ Education	▪ Academic Instutions (numbers of each primary school, secondary schools, colleges, universities, madrasahs)	BBS, LGED
	▪ Access to Health	▪ Healthcare Establishments (numbers of each hospital, clinics, diagnostic centres)	DGHS
	▪ Electricity	▪ Consumption and Connection (frequency or %)	BBS, LGED, BPDB
	▪ Water, Sanitation & Hygiene	▪ Drinking Water (Number of Tubewells, PSF, RWH, AIRP, Ponds, and Rivers in length)	BBS, DPHE, LGED
	▪ Urban aspects	▪ Drainage (Length of Urban drainage in kms)	BBS
	▪ Livelihood	▪ Agriculture (total area arable land in acre), Cropping Intensity (%), Crop production (tonnes), Fisheries/Aquaculture (total area covered in acre), Livestock (frequency), Small Cottage (frequency), Industries (frequency)	BCA, DAE
	▪ Geophysical Information	▪ Tertiary hill areas, Pleistocene Uplands, Drought-prone areas, Haor and Flash Flood areas, Coastal Zones, Urban areas (all areas in sq. kms)	CEGIS, BCA, LGED
	▪ Digital Elevation Model	▪ Height from MSL (spot height in metre/cm)	BMD, SOB
	▪ Hydrological data	▪ River/Canal/Waterbodies/Wetland	BCA, LGED, WARPO
	▪ Cyclone Shelter	▪ Cyclone Shelter (number of cyclone shelters)	DDM
▪ Adaptive Capacity	▪ Socioeconomic Profile	▪ Literacy (total number of literacy and illiteracy, male and female too)	BBS
	▪ Livelihood Strategies	▪ Agriculture, Fisheries, Livestock, Small Cottage, Industries, Service (number of people engaged in each category)	BCA, DAE
	▪ Access to Facilities	▪ Medical facilities (number of people get medical facilities)	DGHS
	▪ Social Network	▪ Media Connection (Mobile Phone, Facebook, WhatsApp, YouTube, Twitter, Tok-tok): Number of people connected	UNDP/????
	▪ Food security	▪ Varieties of crops (saline tolerant rice variety, rice varieties for flash flood areas, drought resistant rice varieties)	DAE
	▪ Trained Personnel	▪ Competent Personnel (number of people received training on climate resilience)	UNDP/?????
	▪ Equipment & Technology	▪ Devices (radio, mobile phones, TV, internet facilities): Number of people got each facility	HIES
	▪ Emergency Response Plan & Contingency	▪ Infrastructure (number of cyclone shelters, flood protection embankments in kms, and coastal embankment in kms)	LGED, DDM
		▪ Early Warning System (EWS for cyclone/flood/storm)	FFWC, SPARRSO, CPP
		▪ Afforestation (afforestation in coastal areas in acres)	LGED

Apart from climatic data, it is needed information about historical climatic events and that can be collected from several organizations. They are:

- Bangladesh Space Research and Remote Sensing Organization (SPARRSO),

- Flood Forecasting Warning Centre (FFWC),

- Cyclone Preparedness Programme (CPP),

7.1.3 Non-spatial Attribute Data

For sensitivity analysis and adaptive capacity, it is vital to consider several relevant attribute information. In the aspect of sensitivity analysis, we have to consider several parameters and they are based on the six priorities in the context of Bangladesh. They are:

- Connectivity (road, river, and rail transportation),

- Water and irrigation management,

- Housing characteristics,

- Livelihood and Employment (agriculture, fisheries, livestock, small cottage, industries, education, and other primary, secondary, and tertiary economic activities,

- Water supply, sanitation and hygiene (WASH),

- Access to health

It is also required adaptive capacity (AC) information to complete the CVI analysis. Without AC, no DRR system will be applied and achievable. In this case, there are a number of important parameters. They are:

- Social network,

- Adequately trained personnel,

- Access to facilities offering shelter (e.g., cyclone shelters),

- Equipments and Technology,

- Emergency response plan and contingency.

All these information can be available in different sources, and they are as follows:

- Bangladesh Bureau of Statistics (BBS),

- Water Resource Planning Organization (WARPO),

- Bangladesh Water Development Board (BWDB),

- Department of Public Health Engineering (DPHE),

- Department of Agricultural Extension (DAE),

- Soil Resource and Development Institution (SRDI), and so on

It is noted that all the relevant information for analysing CVI will be provided by the UNDP. But the consultant are collecting some information from different sources.

7.2 Data Editing and Management

The relevant spatial data will be cross-checked with different sources of information. It is noted that there are discrepancies in the accuracy of geospatial data and in some cases the data precision can be deviated more than a kilometers and this can be a serious problem in the *union* level CVI mapping. Different spatial data from different stakeholders relevant for this CVI mapping are characterised with different projections, different scales, different accuracy. In addition, there are sliver polygons in existing data sources, and this can be visible at the lower level administrative tier. Therefore, it is crucial to check the error level of spatial data and edit them for minimizing the error.

There are also problems in climatic data. There are missing information about climatic data and inconsistency in the figures in many meteorological stations. They will be checked and edited using suitable formula option, e.g., missing precipitation data. Moreover, there are discrepancies in attribute data from different sources. We will check them properly and consider for CVI analysis. The corrected and edited data will be formatted following the mapping protocol.

7.3 Climate Data Downscaling

The collected climate data for 30 years (1991 to 2020) will be used for downscaling for union level CVI analysis. The BMD provided climate data for 1991-2020 will be treated as the baseline data. Figure 2.0 shows a methodological framework for spatial and temporal downscaling of climate data in Bangladesh. We will consider statistical downscaling that depend on current climate observations (baseline data) and the assumptions. Moreover, the current observed relationships will be used to analyse the future climate data. The Delta Method will be applied to statistically downscale the BMD data with "change factor" method. The "change factor" method is the ratio between BMD simulations of future and current climate.

Climate models are to understand how the climate has changed in the past and may change in the future. These models simulate the physics, chemistry and biology of the atmosphere, land and oceans in detail. Climate models are constantly being updated, as different modelling groups around the world incorporate higher spatial resolution, new physical processes and biogeochemical cycles (https://www.carbonbrief.org/cmip6-the-next-generation-of-climate-models-explained).
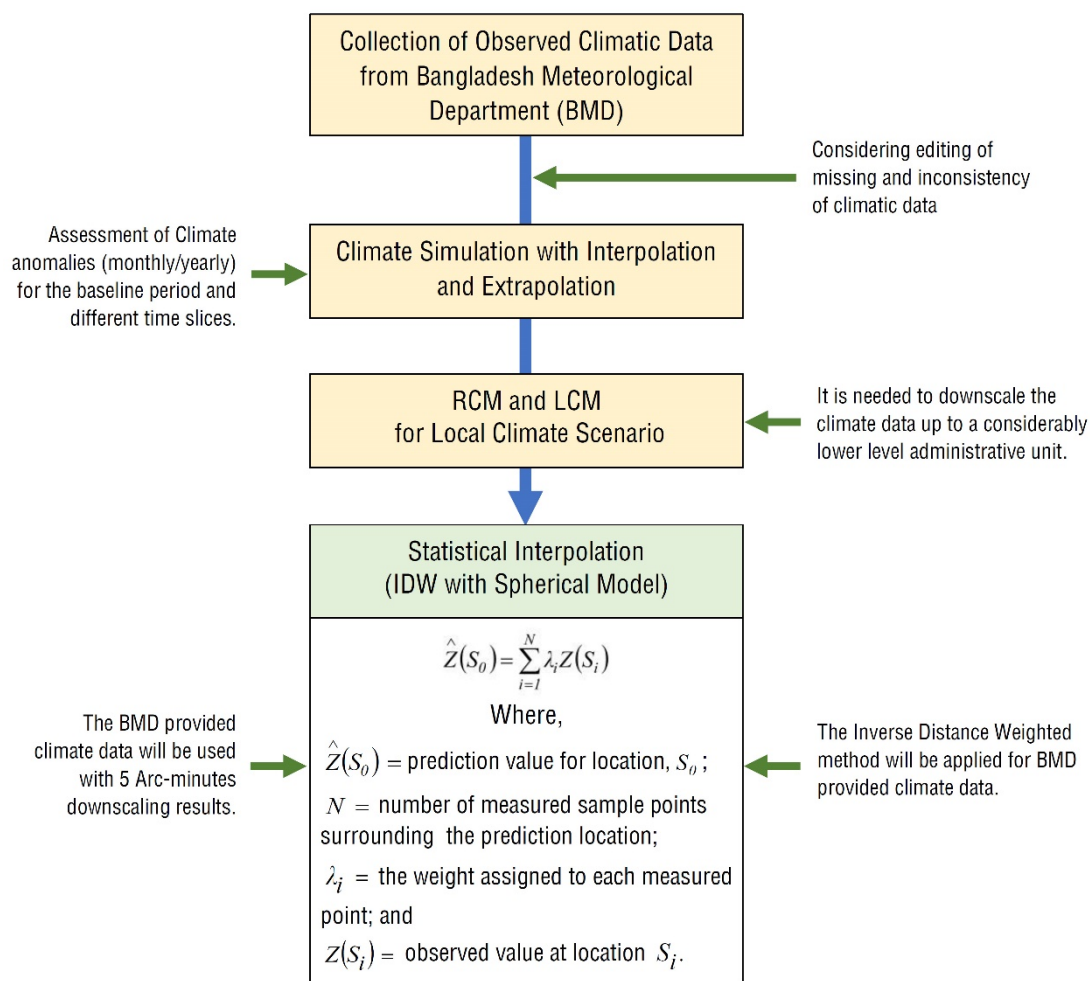
Figure 2.0:
Climate data downscaling and projection for future scenario

The climate data can be downscale with SDSM (Statistical Downscaling Model) or SimCLIM or ArcGIS software (Figure 3.0). A number of existing models will also be applied in downscaling the climate data. In addition, the prediction for the pattern of climate change and climate events in different time slices can be analysed with exponential modelling with "R". Bias-corrected spatial disaggregation (BCSD) is a statistical method that will be utilized to downscale ensemble climate model forecasts at spatial and temporal scale. This method involves two steps: bias correction and weather generation. It is noted that daily weather information can be utilised if available from the BMD.

The climate modelling groups coordinate their updates around the schedule of the IPCC assessment reports. These coordinated efforts are part of the Coupled Model Intercomparison Projects (CMIP). The 2013 IPCC fifth assessment report (AR5) featured climate models from CMIP5, while the upcoming 2021 IPCC sixth assessment report (AR6) will feature new state-of-the-art CMIP6 models. CMIP6 consists of the "runs" from around 100 distinct climate models being produced across 49 different modelling groups. Since CMIP6 models will be used in IPCC

AR6, we will utilise the CMIP6 models generated SSP (Shared Socioeconomic Pathways) climatic data. The data can be available in 20 years interval from 2021 to 2100 with tiff format.Carbon Brief provides an overview of the future emissions scenarios that are being used in CMIP6. This includes an examination of the climate sensitivity, past and future warming in CMIP6 models released so far, and a look at how they compare with the prior generation of models in CMIP5. In the lead up to the IPCC AR6, the energy modelling community has developed a new set of emissions scenarios driven by different socioeconomic assumptions. These are the "Shared Socioeconomic Pathways" (SSP). A number of these SSP scenarios have been selected to drive climate models for CMIP6. The IPCC AR5 featured four Representative Concentration Pathways (RCP) that examined different possible future greenhouse gas emissions. These RCP scenarios (e.g., RCP2.6, RCP4.5, RCP6.0, and RCP8.5) have new versions in CMIP6. These updated scenarios are called SSP scenarios (e.g., SSP1-2.6, SSP2-4.5, SSP4-6.0, and SSP5-8.5) that result in similar 2100 radiative forcing levels as their predecessor in AR5.
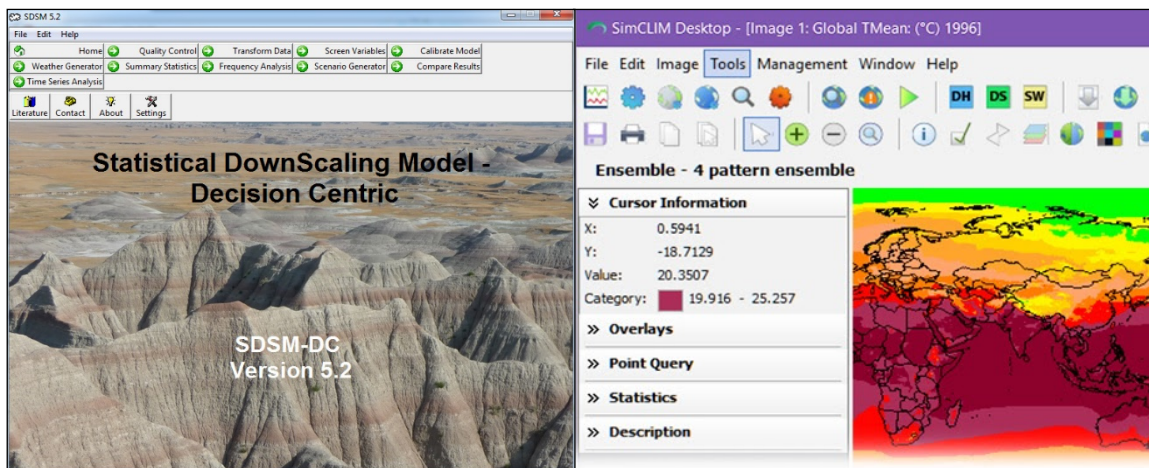

Figure 3.0:
SDSM and SimCLIM software for climate data downscaling

Downscaling of the BMD provided climate data can be further analysis through Inverse Distance Weighted (IDW) method with spherical model or with ArcGIS (10.x) for union-level distribution. The IDW interpolator is a point estimation technique based on the weighting of a random function for a particular cell node of a grid (Serón et al, 2001). The IDW interpolator assumes that each input point has a local influence that diminishes with distance. It weights the points closer to the processing cell greater than those further away, hence the name IDW interpolation or Inverse Squared Distance (ISD) interpolation (Ashraf et al, 1997; Hassan, 2018; Isaaks and Srivastava, 1989). After getting the interpolation map with downscaled data from baseline, we can then distribute to different unions, city corporations, and Pouroshovas in all over the country.

The selected downscaling method for this study will be based on thin plate spline spatial interpolation of anomalies (deltas) of original BMD observed data or it will be from GCM outputs. It is noted that anomalies are interpolated between GCM cell

centroids and are then applied to a baseline climate given by a high resolution surface. Relationships between variables in the baseline (e.g., "current climates") are likely to be maintained towards the future. It will be considered several aspects and assumptions for climate downscaling. We will follow the following steps to accomplish the task:

- Gathering of baseline data (current climates corresponding to BMD).

- Gathering of full BMD data timeseries.

- Calculation of 30 year running averages for present day simulations (1991-2020) and 3 future periods or time slices (e.g., 2030, 2050, 2100).

- Calculation of anomalies as the absolute difference between future values in each of the 3 variables to be interpolated (minimum and maximum temperature, and total precipitation).

- Interpolation of these anomalies using BMD meteorological points as cells for data downscaling. There are a total of 57 meteorological stations or points in Bangladesh. With 10 arc-minutes of spatial resolution, there will be more than 2000 cells for climatic grids within Bangladesh for downscaling (Figure 4.0).

- Calculation of mean temperature as the average of maximum and minimum temperatures.

- Apart from interpolated surfaces to the current climates from BMD, absolute sum for temperatures and relative changes for precipitation.
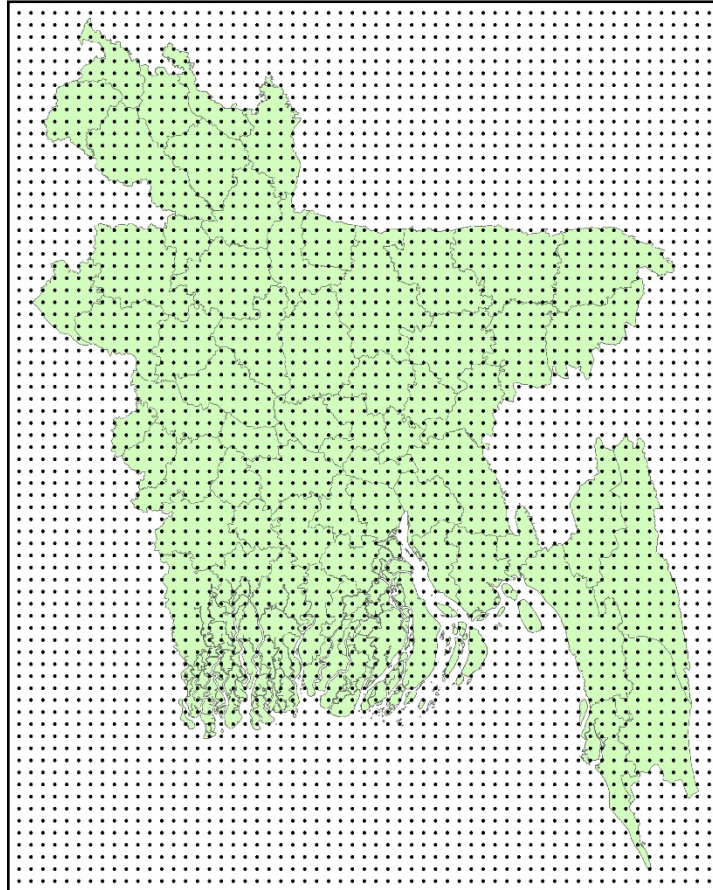
Figure 4.0:
Selected cells or climatic grids within Bangladesh

7.4 Calculation of CVI

The CVI calculation is the main task of this study. The concept of "vulnerability" has been changed since 1970s and the concept now shaped with the "degree of loss". The CVI can be expressed with the function of exposure, sensitivity, and adaptive capacity (Figure 5.0). These three components got several parameters. We have already mentioned about climate variability as the exposure. The sensitivity data will cover several parameters that have already mentioned in the previous section in Table 1.
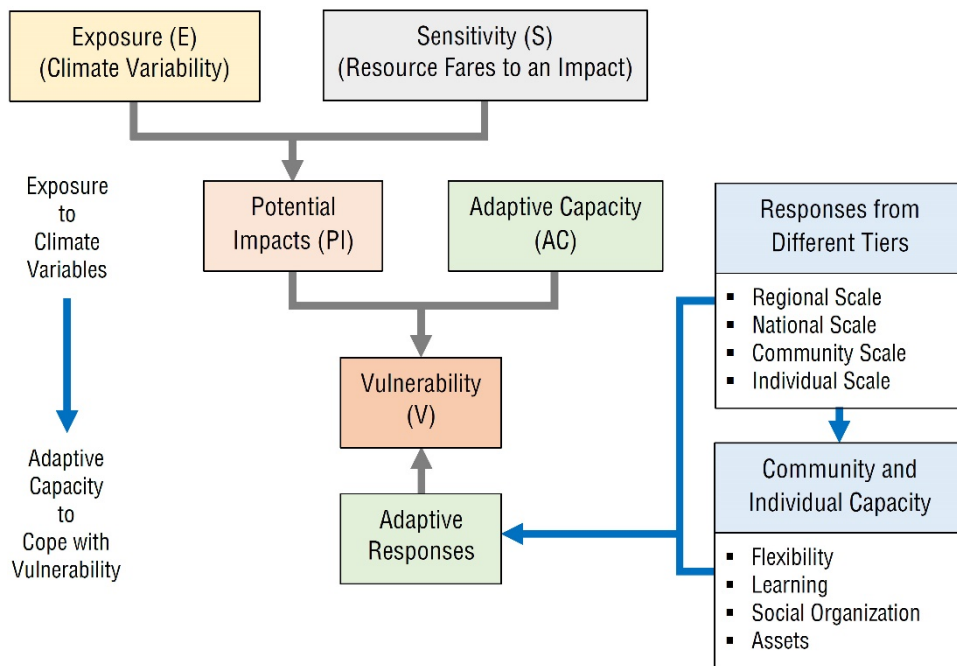
Figure 5.0:
Components and Weighted Metrics of Climate Vulnerability Index

7.4.1 Vulnerability Appraisal

The weighted average method was deployed for this project to develop the vulnerability index. This method is easy transfer to a composite index with the original weighted data (Abbas and Routry 2014; Sattar and Cheung 2019; Sorg et al. 2018). The calculation process of CVI is based on main variables (E, S, and AC) that are comprised with some sub-variables $E_1 \div E_n$, $S_1 \div S_n$, and $AC_1 \div AC_n$, respectively, and each sub-variable could be comprised of different correlative components that is known as indicator variables as $E_{11} \div E_{1n}$, $E_{n1} \div E_{nn}$, $S_{11} \div S_{1n}$, $S_{n1} \div S_{nn}$, và $AC_{11} \div AC_{1n}$, and $AC_{n1} \div AC_{nn}$ (Duong et al., 2017). Main variables, sub-variables and indicator variables will be outlined as per figure 6.0.

Figure 6.0:
Vulnerability components and calculation procedure
(Source: Duong et al., 2017)

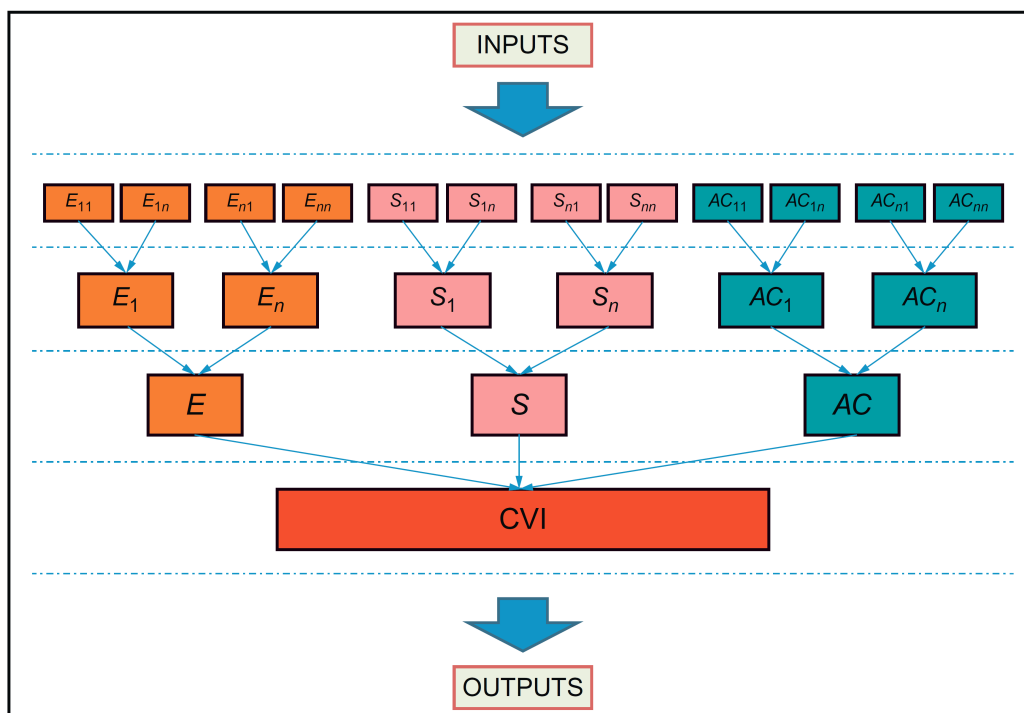It is required to calculate all the components as per the formula options in Figure 7.0. All the sub-variables and their indicator variables will be identified during the inception phase and accordingly calculate their weights. Calculation of the index of sub-variables and then calculation of the index of main variables will finally be used for CVI calculation. To calculate indexes of exposure, sensitivity, adaptation capacity, and climate change vulnerability index (CVI), the following formulas will be used: (a) Normalization of collected input data; (b) calculation of weights of indicator variables; (c) calculating the sub-variables index; (d) calculating the main variables index; and (e) calculating CVI.

Based on the contents and equations mentioned in Figure 7.0, the process is to identify and
calculate a climate vulnerability index as well as the indexes of exposure, sensitivity, and
adaptive capacity, and is done as follows:

- The first and most important step is to identify the number of indicator variables ($E_{11} \div E_{1n}$, $E_{n1} \div E_{nn}$, $S_{11} \div S_{1n}$, $S_{n1} \div S_{nn}$, và $AC_{11} \div AC_{1n}$, $AC_{n1} \div AC_{nn}$). In theory, a greater number of indicator variables will make the results calculation more accurate. This step will be carried out through a literature review and expert consultation.

- The identified and collected indicator variables will have different units; therefore, to apply the index method they will be normalized, and the

methodology used in UNDP's Human Development Index (HDI) (Assa and Meddeb, 2021) is followed to normalize them (Equation 1 in Figure 7.0).

- Currently, there are three main methods to calculate weights: (a) method with equal weights; (b) method with unequal weights, which is divided into two types (e.g., expert judgment, and the Iyengar and Sudarshan method (Duong, 2009)); and (c) multivariate statistical techniques (Equation 2 in Figure 7.0).

- As mentioned above, each main variable (E, S, and AC) will have many sub-variables ($E_1 \div E_n$, $S_1 \div S_n$, and $AC_1 \div AC_n$, respectively) and these sub-variables will be calculated using weights calculated by the previous step (Equation 3 in Figure 7.0).

- After having the sub-variables, the main variables will be calculated using Equation 4 in Figure 7.0.

- Finally, Equation 5 in Figure 7.0 will be used to calculate the CVI.

Identification and Input of Sub-variables and their Indicator Variables

Normalization of Collected Input Data

$$X_{ij} = \frac{X_{ij} - MinX_{ij}}{Max_{Xij} - MinX_{ij}}$$

Calculation of Weights (W_j) of Indicator Variables

$$W_j = \frac{C}{\sqrt{Var(X_{ij})}} \quad Where, C = \left[\sum_{j=1}^{k} \frac{1}{\sqrt{Var(X_{ij})}} \right]$$

Calculation of Index of Sub-variables $(E_1/E_n, S_1/S_n, AC_1/AC_n)$

$$M = \frac{\sum_{i=1}^{n} W_{ij} X_{ij}}{n}$$

Calculation of the Index of main variables (E, S, and AC)

$$CF = \frac{\sum_{i=0}^{n} W_M M_i}{\sum_{i=0}^{n} W_{Mi}}$$

Calculation of Climate Vulnerability Index (CVI)
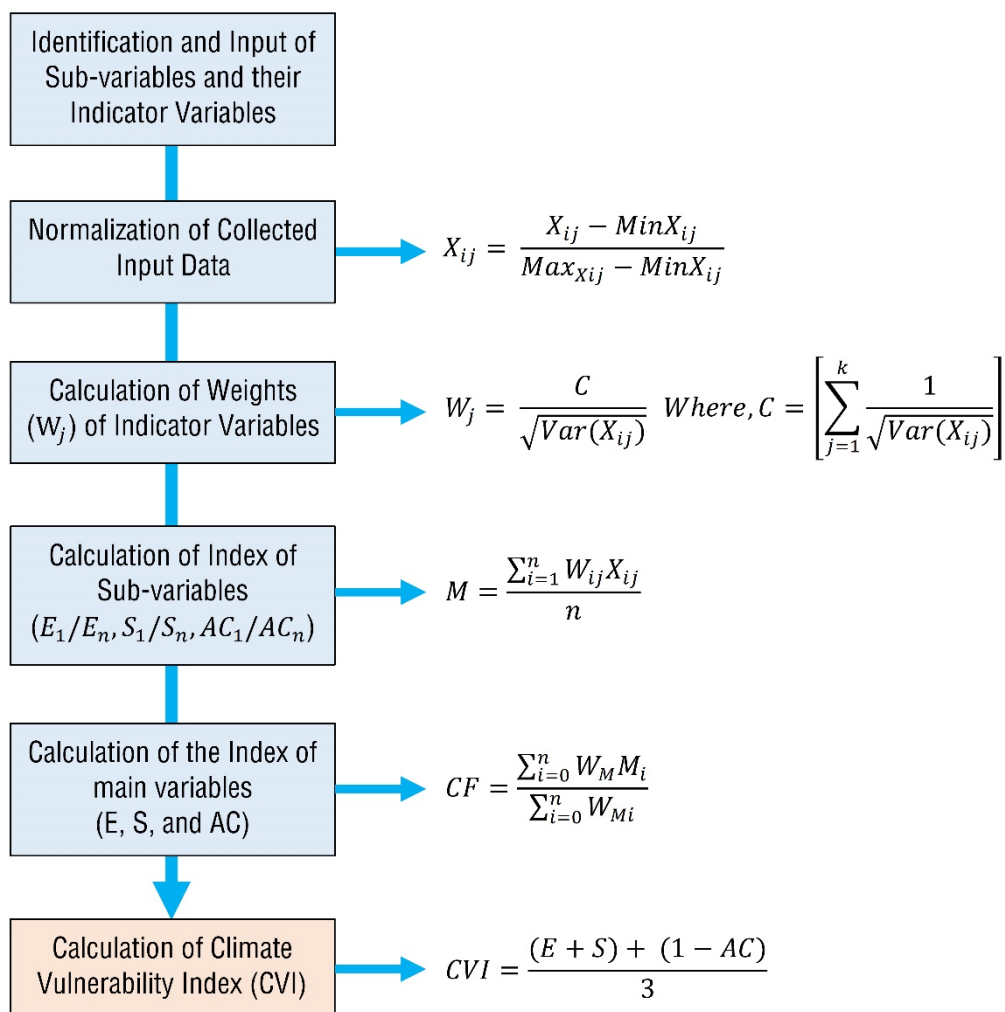
$$CVI = \frac{(E + S) + (1 - AC)}{3}$$

Figure 7.0:

7.4.2 Indicators and Weights

In calculating CVI, it is also needed to calculate different indices, e.g., climate scenario index (e.g., temperature index and precipitation index), sensitivity index (e.g., climate associated disease index, poverty index, sociodemographic sensitivity index), and adaptive capacity index (e.g., socioeconomic structure index) as mentioned earlier. A plethora of literature on CVI identified a number of indicators for analysing CVI. In this study, we have already identified some suitable indicators under different main variables with justification. Das et al (2020) shows a list of selected variables with detail description (Table 2.0).

In addition, Salam et al (2021a) identified several indicators along with the related weight values (Table 3.0). The indicator classes are categorised into "0" to "1" score based on actual and perceived risk components. For instance, the lowest hazard, sensitivity, exposure, and capacity classes are allocated the lowest weight values of <1 and higher is 1. In addition, "1" and "0" weights are utilized for "yes" and "no" classes. There are several categories of classes with weights. They are: (a) assigned as 0.33, 0.67, and 1; (b) four classes are assigned as 0.2, 0.4, 0.6, 0.8; or 0, 0.33, 0.67, and 1; (c) five classes are assigned as 0, 0.2, 0.4, 0.6, 0.8 and 1; or 0, 0.25, 0.50, 0.75, and 1.

Therefore, the values of both the actual and perceived risk indices are between 1 and 0. The weights will be assigned based on available literature and fieldworks. Some of the literature on CVI provided different weights for different indicators and almost same weight for same indicator (Barua et al. 2016; Flanagan et al. 2011; Karim and Thiel 2017; Nhuan et al. 2016; Roy et al. 2015; Salam et al. 2021a; Sattar and Cheung 2019; Sattar et al. 2018; Saunders and Senkbeil 2017; Udmale et al. 2014; Zhang et al. 2017) (Table 4.0). In addition, we will try to collect people's perception regarding climate vulnerability and weights of different variables and compare them with literature-based published information. Any deviation can be consulted with national experts.

Table 2:
Description of the selected variables for vulnerability assessment

Factors	Concepts	Variables	Explanation of Variables	References
E1	▪ Climate variability	▪ Maximum temperature	▪ Standard deviation of the average daily maximum temperature by month last 30 year is averaged	Hahn et al. 2009; Heltberg & Bonch-Osmolovskiy 2011
E2		▪ Minimum temperature	▪ Standard deviation of the average daily minimum temperature by month last 30 year is averaged	Hahn et al. 2009
E3		▪ Average precipitation	▪ Standard deviation of the average monthly precipitation last 30 year is averaged	Hahn et al. 2009; Shah et al. 2013
E4	▪ Natural hazards	▪ Flood	▪ Percentage of area inundated with high return period flood during last 10 years	Hahn et al. 2009; Shah et al. 2013; Boruff & Cutter 2007
E5		▪ Cyclone	▪ Interpolated (kernel density estimation) wind speed (m/s) of tropical cyclone over last six decades	Hahn et al. 2009; Balica et al. 2012
E6		▪ Coastal erosion	▪ Rate of coastal erosion (sq. km/year)	Balica et al., 2012
S1	▪ Demographic profile	▪ Population density	▪ Number of people per square kilometre	Armas & Gavris 2013; Wu et al. 2002
S2		▪ Average household size	▪ Average number of people per household	Adger 1999; Cutter et al. 2003
S3		▪ Female population	▪ Percentage of female population to total population	Cutter et al. 2003; Armas & Gavris 2013
S4		▪ Child population	▪ Percentage of population under 7 years age (0–6 age group) to total population	Cutter et al. 2003
S5	▪ Socioeconomic status	▪ Socially disadvantaged people	▪ Percentage of scheduled caste and scheduled tribe population to total population	Samanta et al. 2017
S6		▪ Food insecurity	▪ Percentage of households that can manage less than one or one square meal a day for major part of the year	Heltberg & Bonch-Osmolovskiy 2011
S7		▪ Land holding	▪ Percentage of households without land holding	Samanta et al. 2017
S8		▪ Poverty	▪ Percentage of population living below the poverty line	Cutter et al. 2003; Siagian et al. 2014
S9		▪ Rural population	▪ Percentage of rural population to total population	Cutter et al. 2003
S10	▪ Livelihood activity	▪ Agricultural dependency	▪ Percentage of cultivators and agricultural labours (dependent on agriculture) to total working population	Cutter et al. 2003; Heltberg & Bonch-Osmolovskiy 2011
S11		▪ Marginal workers	▪ Percentage of marginal workers (not work for major part of the reference period i.e., <6 months) to total working population	Kapur 2010
S12		▪ Non-workers (dependents)	▪ Percentage of total non-workers (not work at all in any economically productive activity - students, persons engaged in household duties, dependents) to total population	Armas & Gavris 2013; Myers et al. 2008
A1	▪ Human resource capacity	▪ Literacy rate	▪ Percentage of literates to the total population age 7 years and above	Brenkert and Malone 2005
A2		▪ Work participation rate	▪ Percentage of total workers (main and marginal) to total population	Dhar 2014
A3	▪ Economic security	▪ Salaried job	▪ Percentage of population working in organised/formal sector (regular salaried employed)	Mannila 2015
A4		▪ Home ownership	▪ Percentage of households have their own home	Cutter et al. 2003; Eric 2012
A5		▪ Household assets	▪ Percentage of households have household assets	Samanta et al. 2017; Boruff & Cutter 2007; Vincent 2007
A6	▪ Infrastructure	▪ Pucca houses	▪ Percentage of households living in Pucca houses (permanent structure)	Samanta et al. 2017
A7		▪ Health care centres	▪ Number of health care centres	Yoo et al. 2011
A8		▪ Educational institutes	▪ Number of educational institutes	Bryant et al. 2000
A9		▪ Road density	▪ Length of roads (in km) per sq. km	Brooks & Adger 2004
A10	▪ Basic facilities	▪ Sanitation	▪ Percentage of households have sanitation facility within premises	Cannon et al. 2003
A11		▪ Electricity	▪ Percentage of households have electricity connection	Boruff & Cutter 2007; Cannon et al. 2003.
A12		▪ Safe drinking water	▪ Percentage of households reported tap water from treated source as main source of drinking water	Spence & Walters 2012
A13	▪ Agro livelihood strategies	▪ Crops	▪ Number of crops grown in a year	Hahn et al. 2009
A14		▪ Irrigation	▪ Percentage of irrigated area to total cultivated area	Thapa et al. 2016
A15		▪ Fertilizer	▪ Number of fertilizer depots	Bryan et al. 2015

Note: E: exposure; S: sensitivity; A: adaptive capacity. All the variables are showing the positive functional relationship with IPCC contributing factors which means the higher the value, higher the hazard/exposure/sensitivity/adaptive capacity.

Table 3.0:
Relevant indicators for vulnerability assessment with weights

SL	Indicators	Classes	Weights	Explanations	Source
Hazard component of disaster risk					
1	Drought Intensity	Very low Low Moderate High Very High	0.20 0.40 0.60 0.80 1.00	Higher intensity means much severity and resultant damage	Saha 2009
2	Frequency of Drought	0 1-2 3-4 5-6 >6	0.00 0.25 0.50 0.75 1.00	Past drought events indicate that the study areas are prone to drought hazards	Barua et al. 2016; Rana et al. 2010; Roy et al. 2015
3	Duration of drought (in month)	1-2 2-3 3-4 4-5 5-6	0.20 0.40 0.60 0.80 1.00	Prolonged drought is responsible for higher damage as well as loss	Boruff 2009
4	Loss of crop production	Very low Low Moderate High Very High	0.20 0.40 0.60 0.80 1.00	Higher rate of the loss of crop production increases the susceptibility of hazard occurrence.	Sattar and Cheung 2019
5	Loss of livestock	Very low Low Moderate High Very High	0.20 0.40 0.60 0.80 1.00	Higher rate of the loss of crop production increases the susceptibility of hazard occurrence.	Sattar and Cheung 2019
6	Loss of poultry	Very low Low Moderate High Very High	0.20 0.40 0.60 0.80 1.00	Higher rate of the loss of poultry increases the susceptibility of hazard event.	Sattar and Cheung 2019
Exposure (Vulnerability) component of disaster risk					
1	Availability of water body near agricultural land	Yes No	0.00 1.00	Availability of water body near agricultural field decreases the vulnerability.	Cutter et al. 2000
2	Irrigation type	Surface water Shallow machine Deep Tube well	0.33 0.67 1.00	Watering system	Udmale et al. 2014
3	Family type	Nuclear Joint Single	0.67 0.33 1.00	Single family has less access to resources than others.	Flanagan et al. 2011
4	Household pattern.	Kucha Pucca	1 0	Kucha housing type is more vulnerable than pucca in terms of any disaster.	Fedeski and Gwilliam 2007

S L	Indicators	Classes	Weights	Explanations	Source
5	Level of respondent's drought understanding.	Very High High Moderate Low Very Low	0.20 0.40 0.60 0.80 1.00	Respondents who understand drought will be less affected as they know how to avoid damage as well as losses.	
6	Household's received warning	Yes No	0.00 1.00	Getting early warning can minimize the loss and damages as households are prepared to fight against drought hazard.	Hahn et al. 2009
Sensitivity component of disaster risk					
1	Average monthly household's income (Taka)	<5000 5000-10000 10000-15000 15000-20000 >20000	1 0.80 0.60 0.40 0.20	Higher income households have less vulnerability as they have the capability to take any mitigation and adaptation options.	Khan 2012
2	Occupation of household's head	Unemployed Daily laborer Farming Business Govt/Other services	1 0.80 0.60 0.40 0.20	Household's head who has no income source poses more vulnerability and secure as well as permanent income sources household's poses less vulnerability.	Cutter et al. 2003
3	Number of household dependents	≤1 2 3 4 >4	0.20 0.40 0.60 0.80 1.00	Large number of dependents as disables, older, child etc. increases the risk of vulnerability.	Khan, 2012; Cutter et al. 2003; Phung et al. 2016
4	Chronic illness/pregnancy or disability.	0 1 2 >2	0.00 0.33 0.67 1.00	Special needy peoples have not enough mobility and for the reasons in the time of emergency evacuation, they can't move their own self rather they need the help of others.	Birkmann et al. 2013; Ahsan and Warner 2014
5	Household living in the community (in years)	>40 30–40 20–30 10–20 <10	0.20 0.40 0.60 0.80 1.00	Households who live long time in the area being familiar with drought intensity, frequency and therefore know how to reduce risks.	Birkmann et al. 2013; Field et al. 2012
6	Households who have taken out loans in the last ten years.	No Yes	0.00 1.00	Households which have a loan are more vulnerable because it means they face economic challenges to maintain debt repayments.	Hahn et al. 2009
7	Households have access to tube-well	Yes No	0.00 1.00	Access to tube well means the households has no need to pay for getting the safe drinking water.	Zhou et al. 2015; Hahn et al. 2009; Ahsan and Warner 2014
8	Formal community organization	Yes No	0.00 1.00	Community organization takes some real time strategies for reducing the drought risks as	Karim and Thiel 2017

S L	Indicators	Classes	Weights	Explanations	Source
				establishment of community forest.	
9	Food shortages	Very Low Low Moderate High Very High	0.20 0.40 0.60 0.80 1.00	Food availability decreases the risk of vulnerability and food shortage increases the risk of vulnerability.	Kulatunga et al. 2014
10	Any violence	Very Low Low Moderate High Very High	0.20 0.40 0.60 0.80 1.00	Households affected by violence in the time of severe drought indicates the absent of social security as well as higher risk.	O'bryan 2016; Islam et al. 2017; Krug et al. 1998; Dilley and Boudreau 2001
Capacity component of disaster risk					
1	Number of earning members in household	0 1 2 >2	0 0.33 0.67 1.00	Higher number of earning members increases the capacity of households.	Nhuan et al. 2016
2	Household head's education level	Illiterate Primary Secondary Higher Secondary Graduation	0.2 0.4 0.6 0.8 1	Literate people are more aware of the impacts of drought and willingly take initiatives to reduce the vulnerability.	Zhou et al. 2015; Hahn et al. 2009; Ahsan and Warner 2014; Nhuan et al. 2016; Gain et al. 2015
3	Household livelihood options	Yes No	1 0	Multiple income sources mean better capacity of any households	Hahn et al. 2009; Nhuan et al. 2016
4	Households having insurance (life, health)	Yes No	1 0	Insurance increases the household coping capacity	Birkmann et al. 2013; Nhuan et al. 2016
5	Households having any kind of savings.	Yes No	1 0	Any type of savings can help the households to recover from any drought hazard quickly.	Blaikie et al. 2005
6	Any NGO for giving training.	Yes No	1 0	Training can enhance the respondent's capability to cope up with the drought.	
7	Any members having training upon drought	Yes No	1 0	Trained up people can better understand what and when to do what.	
8	Households who have experience with drought	Yes No	1 0	Experienced (drought experience) households know how to avoid the risks of drought that means they have high capacity.	Nhuan et al. 2016
9	Households having relatives outside the drought prone area	Yes No	1 0		
10	Households aware of emergency activities	Yes No	1 0	Awareness of emergency activities means they can take	Blaikie et al. 2005; Hosseini et al. 2014

S L	Indicators	Classes	Weights	Explanations	Source
				real time decision during drought period.	

Table 4.0:

Indicators for perceived risk/ vulnerability assessment with weights

SL	Indicators	Classes	Weights	Explanations	References
1	Likelihood of drought occurrence	Very high High Moderate Low Very low	1 0.8 0.6 0.4 0.2	Possibility of the occurrence of more future drought means higher risk.	Armaş and Avram 2009; Qasim et al. 2015
2	Dread/Fear	Very much afraid Afraid Neutral Slightly afraid Not afraid	1 0.8 0.6 0.4 0.2	Feeling less afraid of drought means lower risk perception.	Armaş and Avram 2009; Qasim et al. 2015
3	Likelihood of future damage from drought	Very high High Moderate Low Very low	1 0.8 0.6 0.4 0.2	Perception on higher damage means possibility of higher risk.	Saunders and Senkbeil 2017; Zhang et al. 2017
4	Ability to cope	Very low Low Moderate High Very high	1 0.8 0.6 0.4 0.2	Lower coping ability means high risk perception and vice-versa.	Alam and Collins 2010; Mallick et al. 2017; Terpstra and Gutteling 2008
5	Altering relationships	Very high High Moderate Low Very low	1 0.8 0.6 0.4 0.2	Higher probability of altering relationship means higher perception of risk and vice-versa.	Armaş and Avram 2009
6	Knowledge about mitigation actions	Very poor Poor Average Good Very good	1 0.8 0.6 0.4 0.2	Poor knowledge of emergency actions and mitigation measures indicates high risk because they don't know what to do.	Terpstra and Gutteling 2008

7.5 GPS and Satellite Data

The high-accurate GPS devices and satellite imageries will be utilized for collecting the geographical coordinates for field verification with ground-truthing of existing service facilities from the LGI levels. All this field verification will be conducted during our fieldwork. The National Consultants got several high-accurate GPS devices for field data verification. The real field situation of the ground will be

depicted on the map and this map can be used for CVI and any planning for spatial decision-support for climate hazards. Google Earth satellite information will mainly be utilized for getting some spatial data for this project.

7.6 Fieldwork and Data Validation

The calculated value for CVI can be verified with fieldworks. Sensitivity and adaptive capacity are different in different geophysical areas in Bangladesh. Therefore, it is vital to conduct fieldworks to make the variables and sub-variables authentic and realistic for CVI analysis. It is also needed information from different geophysical areas as well as different climate-induced hazardous zones for sub-criteria ranking/weight information for CVI analysis. There are six main geophysical areas in Bangladesh (e.g., Chattogram Hill Tracts, Coastal Zone, Barind and Drought Prone Areas, River System and Estuaries, Haor and Flash Flood Areas, and Urban Areas) as per Bangladesh Delta Plan 2100, and it will be justifiable to select three LGI from five geophysical areas and two Pouroshava and one City Corporation from Urban Areas. Therefore, a total of 18 sites will be selected for fieldworks. It is needed to arrange a total of 18 Focus-Group Discussions (FGD) in this connection. In addition, around 50-60 in-depth interview (Carey, 1995; Wainwright, 1997) and KII sessions will be conducted to address the breadth of coverage to cope with the climate vulnerability.

The fieldwork will be conducted after developing a database with exposure, sensitivity, and adaptive capacity. It has already mentioned that the database will be provided by the UNDP, but the consultant will also collect some relevant available data from the published sources. Table 1 shows in detail about the sources of required data for CVI analysis. A total of 5 weeks of fieldworks will be required to meet the data collection and data verification for the project. Table 6 shows the time schedule for conducting the fieldwork. It is noted that a detail plan will be developed just after submitting the second deliverable (spatial and attribute data set). The National Consultant will visit the study sites covering all the six main geophysical areas for conducting the fieldworks.

7.7 Data Analysis

All the collected data will be analysed for CVI mapping. The CVI map shows the distribution pattern of vulnerability index in different Spatio-temporal aspects. The collected information for both the quantitative and qualitative format as well as GPS data will be analyzed with multi-method approach. Advanced linear model for quantitative analysis, interpretive hermeneutical phenomenology for qualitative enquiry, and point interpretation techniques will be deployed for developing the report.

7.7.1 Quantitative Analysis

A simple frequency distribution will be deployed for analyzing the pattern of CVI situation in all over the country. A bivariate analysis as well as Generalized Linear Model (GLM) with Newton-Raphson (maximum likelihood) optimization technique will be deployed for analyzing the association between different components of CVI.

7.7.2 Spatial Mapping

Apart from simple point distribution, proportional symbology and choropleth mapping will be utilized. Moreover, mapping with Inverse Distance Weighting (IDW) estimation will be used for regionalised risk pattern.

7.7.3 Qualitative Mode of Analysis

The qualitative analysis for this study will be based on the interpretation of text and observations. The qualitative data are analysed from multiple perspectives using different analytical methods (Miles and Huberman, 1994). The mode of "thick description" consider the data to be present without interpretation and abstraction; and "rich descriptive narrative" (Strauss and Corbin, 1998) will be employed for vivid presentation of new understanding.

8.0 Study Sites

The study area covers all over the country for the distribution pattern of CVI. The CVI map will cover up to the union level information. It is noted that a total of 4914 unions, 345 Pouroshava, and 12 City Corporations will be considered for this study (Table 5.0).

Table 5.0:
Distribution of different administrative units in Bangladesh

Division	District	Upazila	Union	Pouroshava	City Corporation
Barishal	6	41	352	24	1
Chattogram	11	103	949	62	2
Dhaka	13	88	1248	88	4
Khulna	10	59	579	36	1
Rajshahi	8	67	564	59	1
Rangpur	8	58	535	31	1
Mymensingh	4	35	351	26	1
Sylhet	4	40	336	19	1
Total:	**64**	**491**	**4914**	**345**	**12**

9.0   Work Plan

The mission will have the total duration of 5 months started from the 25 October 2021 to the end of 24 March 2022. But it is needed more time for data entry operation, fieldwork, and data analysis (Table 6.0). The draft report will have to be submitted by the Mid of April 2022 and after incorporating the feedbacks from the UNDP, the Final report will be submitted.

Table 6.0:
Work Plan with Timeline and Deliverables

Sl.	Activities	Time Schedule (25 October 2021 – 30 April 2022)	Deliverables
		November (1–5) · December (6–8) · January (9–14) · February (15–17) · March (18–22) · April (23–25)	
A.	Collection of literature	weeks 1–2	
B.	Review of literature	weeks 3–4	
C.	Preparation of Inception Report	weeks 5–6	**Deliverable I:** Inception Report (30 November 2021)
D.	Collection of secondary data	weeks 7–8	
E.	Spatial data checking and editing	weeks 9–10	
F.	Climate data review and downscaling	weeks 11–12	
G.	Non-spatial data checking & editing	weeks 12–13	
H.	Final preparation for data entry operation	weeks 13–14	**Deliverable II:** Data set (31 January 2022)
I.	Fieldwork for data verification (FGD & KII)	weeks 17–18	
J.	Data analysis for CVI and mapping	weeks 19–21	
K.	Draft Report Preparation	weeks 22–23	**Deliverable III:** Draft Report (15 April 2022)
L.	Final Report Preparation and Submission	weeks 24–25	**Deliverable IV:** Final Report (30 April 2022)

10.0 Possible Findings

There are few studies available for CVI analysis in the context of Bangladesh setting. There are a significant number of literatures on disaster vulnerability. This study would provide spatial mapping information for the "low" to "severe" vulnerable areas in Bangladesh. Moreover, union level information with CVI is grossly absent in this country. Therefore, this study will be utilized for policy formulation with adaptive measures as well as mitigation measures. Mohammed et al. (2014) revealed adaptation options and examined the factors on which adaptation depends under climate change in coastal Bangladesh. Most of the studies show that vulnerability is mainly due to low adaptive capacity. High education, alternative means of livelihood, access to market, transport accessibility, rural development, early warning system etc. can be effective for reduction of vulnerability.

■ ■ ■

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