
Bangladesh

Innovations for Climate Adaptation and Resilience

**Current Status and Needs Assessment
2021**

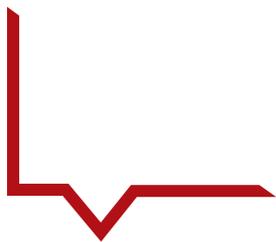


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Executive Summary

This report briefly outlines the Climate Innovation Challenge (CIC) consultation in Bangladesh and related innovation opportunities under CIC for South Asia being administered by ADPC through Program for Asia Resilience to Climate Change, a trust fund administered by the World Bank funded by United Kingdom's FCDO. In this sequence, it essentially provides an overview of Climate Risk Profile of Bangladesh in general and its vulnerability to climate induced disasters in particular that builds an underlying rationale for the launching of CIC in the region.

The global attention to climate change and the risks presented to Bangladesh have caught the imagination of the policymakers at the highest level and there is a much more serious effort now underway to come to grips with this long-term challenge. Recognizing the pivotal role played by the Government agencies of Bangladesh in response to the climate impacts, in line with the CIC project outcomes, this report also accentuate the major relevant portion of National Adaptation Plan, Policies and Strategies of the Government of Bangladesh. In addition, it also highlights the key thematic areas of the Technology Needs Assessment report endorsing the CIC process in Bangladesh as well as take stock of the ongoing various climate initiatives funded by external agencies implemented for building climate resilience.

Accompanied by a strong political will of the government of Bangladesh as one of the promising emerging climate leaders, the current scenario presents an urgent imperative and an opportunity to derive the full potential of innovative technological advancement to reduce vulnerability to disasters and climate risks. In order to understand, appreciate and analyze the climate impacts on key sectors, the technology options in Bangladesh presents a realistic approach for harnessing innovative solutions that fundamentally target the end users (beneficiaries) for ascertaining such efficacy. Besides, and more importantly as part of the CIC process for South Asia, it draws up the results of National Consultation on CIC aimed at assessing the needs for cutting-edge technology solutions as one of the key tools for bridging the gap of adaptation and reducing disaster risk.

The CIC consultation touched upon the overall objective with overwhelming participation from concerned government officials/ representatives of the people and key sector specialists that buttressed the key idea of CIC, at the core of which lies the inherent need for innovative technological solutions. The CIC precisely encourages innovators to demonstrate tech solutions that are potentially scalable and transferable. A pledge for combining funding resources from government's fund by the representative of people in the consultation was the hallmark of the event. The CIC consultation provided an opportunity to ADPC in scientifically providing suggested key thematic areas for possible innovation challenge in Bangladesh and sought concurrence from the

concerned Ministries/Departments and concurrently suggestions from them were also elicited. It systemically accomplishes the CIC consultation by summing up the discussion summary and meeting outcomes.

1. Background

Climate change is a major driver of disaster losses and failed development. Climate related disasters, including the extreme weather events, have dominated the global disaster landscape in the 21st Century, which is shaping new approaches to science and practice in disaster risk reduction, resilience building and climate change adaptation.

The Climate Adaptation and Resilience (CARE) for South Asia project implemented by the Asian Disaster Preparedness Center (ADPC) and supported by the World Bank empowers decision-makers with tools, products, and services to act locally on climate-sensitive issues such as disaster related public policy and planning, agriculture, water, and transport. The Climate Innovation Challenge (CIC) for South Asia and the Tech-Emerge Resilience India Challenge are two important initiatives being administered by ADPC through the Program for Asia Resilience to Climate Change, a trust fund administered by the World Bank funded by the United Kingdom's the Foreign, Commonwealth & Development Office (FCDO).

The CIC for South Asia aims to identify innovations to reduce climate risk and build climate resilience of communities vulnerable to such risks and extremes through award of grants to innovators and scale-up pilots across different sectors, and tiers (national, sub-national and local/community) for greater impact/optimal results. Selected innovators will receive support and grant funding from a pool of 2 million USD to pilot their innovations regionally and/or in the selected countries.

Any innovation and the factors that contribute to it depend on its applicability aimed at spurring priority economic sectors and or targeted areas for which the technology is needed. The technological innovation in addressing climate adaptation and resilience must address societal problems. There has been growing interest in recent years on ways to foster such innovation, in particular, the role that governments can and should play in that process. The Climate Innovation Challenge is a global call for innovators who can bring forward technological solutions that aims to enhance climate resilience, local market and institutional capacity building and create a higher degree of awareness and knowledge among the different types of stakeholders on the use of technology. Scaling up and scaling out pilot initiatives in addressing climate adaptation and resilience is important with appropriate technology and policy planning and implementation.

2. Climate Risk Profile of Bangladesh

Sitting in a predominantly low-lying region at the intersections of the Ganga, Meghna, and Brahmaputra rivers and the Ganga-Brahmaputra delta, Bangladesh is one of the most vulnerable countries in the world to a changing climate. The eighth most populous country in the world, Bangladesh has a population of approximately 165 million people, of which nearly one in three live in poverty. Many of the country's densely populated urban centers are susceptible to increased flooding related to storm surge and sea level rise, and Bangladesh is acutely exposed to tropical cyclones with one hitting, on average, every three years. Most recently, Cyclone Mora struck Bangladesh in May 2017, displacing 500,000 Bangladeshis in coastal areas and damaging 20,000 homes in refugee camps. Strong economic growth, with an average annual increase in gross domestic product (GDP) of 6.2 percent since 2010, is expected to continue and in turn drive an increase in the urban population from its current 36 percent to 56 percent by 2050. The service sector comprises more than half of total GDP and the garment industry also significantly contributes, generating \$28.7 billion in exports in 2016. Meanwhile agriculture employs nearly half the population, while making up 15 percent of GDP. The combination of high and increasing population density, geography, poverty, and weak infrastructure make Bangladesh especially vulnerable to the adverse impacts of climate change.

2.1: Bangladesh vulnerability to climate induced disasters

Due to its topography and climate, Bangladesh is subject to devastating cyclones, mostly in April-May and September -November. UNDP has ranked Bangladesh first of all countries in the world in terms of vulnerability to tropical cyclones. On an average, the country is hit by a severe cyclone every three years. Bangladesh is also vulnerable to flooding, with 80% of its surface forming a giant floodplain. Floods originate from precipitation in the whole of the Ganges-Brahmaputra-Meghna (GBM) River Basin, not just the 7% that lies within Bangladesh, and can therefore be of great magnitude. Almost every year flooding occur in July and August. In an average year, about 25% of the country is inundated. During severe floods that occurs every 4-5 years, over 60% of the country is covered. Riverbank erosion results in the loss of thousands of hectares of agricultural lands and affects the population for decades. Moreover, floods contribute to further salinization of coastal lands, causing not only loss of harvests but also of productive agricultural land. Out of 2.85 million hectares of coastal and offshore areas, about 1.2 million hectares of arable land are already affected by varying degrees of soil salinity. While many parts of Bangladesh suffer from widespread and common floods, other parts experience seasonal droughts. These occur especially in the northwest of the country, and mostly in the months leading up to the November-December rice harvest period.

Significant sea level rise has been measured in Bangladesh, with 4 mm per year at Hiron Point in the west, 6 mm per year at Char Changa in the centre of the country, and even 8 mm per year at Cox's Bazar in the southeast. Sea level rise has been one of the factors that led to an increase in soil salinity in Bangladesh, from 1.5 million hectares under mild salinity in 1973 to 3 million in 2007. Glacial melt in the Himalayas – accelerated by increasing temperatures – is having effects on many of the great river basins downstream, including the GBM river basin. Himalayan glaciers have reduced by 21% (in area) since the 1980s and have lost about 174 gigatonnes of water between 2003 and 2009, which contributed to catastrophic floods in these basins.

In 2020 Cyclone Amphan brought with it severe winds, very heavy rainfall and the risk of damaging storm surges as it made landfall over Bangladesh and India's West Bengal. As a powerful "super Leading experts warned of the impacts climate change was having on supercharging extreme weather events. Climate scientists has asserted that tropical cyclones get their energy from warmer temperatures and the preceding weeks have provided the perfect conditions for this powerful and fast forming storm system. Besides, in terms of climate-induced migration, Bangladesh could see a seven-fold increase of climate migration, forcing 3 million people to migrate from their homes due to climate disasters by 2050. This number is more than double the South Asia average, according to new research from ActionAid International and Climate Action Network South Asia.

2.2: National Adaptation Policies and Strategies of Bangladesh

Bangladesh remains a forerunner in its adaptation endeavors and participates actively in all global discussions on climate change as well as signatory to all related global action programs. Bangladesh submitted its NDC to UNFCCC in 2015 by identifying an adaptation goal to "protect the population, enhance their adaptive capacity and livelihood options, and to protect overall development of country in its stride for economic progress and wellbeing for the people". Bangladesh now chairs the Climate Vulnerable Forum and the Vulnerable 20 Group of Ministers of Finance of the 48 states that constitute the international body for climate threatened nations.

The Government of Bangladesh released its national budget and published fourth climate budget report "Climate Financing for Sustainable Development: Budget Report 2020-2021" recently against the backdrop of two challenges: Covid-19 and a climate disaster. The report presents data and information mainly extracted from the climate budget report titled Climate Financing for Sustainable Development 2020-21 published this year by the Finance Division.

2. <https://reliefweb.int/report/bangladesh/climate-change-profile-bangladesh>

Bangladesh submitted its Initial National Communication in 2002. Bangladesh Second National Communication (SNC) was submitted in 2012 with the financial and technical support of Global Environment Facility / UNDP. Bangladesh's Third National Communication was submitted in 2018 that provides an overview of climate change issues in the country and their implications for the key stakeholders at local, national, regional and global levels.

Bangladesh prepared the National Adaptation Programme of Action in 2005 to address immediate and urgent adaptation needs. Subsequently, in 2008, Bangladesh Climate Change Strategy and Action Plan was formulated to articulate a strategy to manage climate change and its impacts leading towards an action plan of programmes.

Bangladesh is moving forward with an investment plan – the world's first – Country Investment Plan (CIP) that would see US\$ 7 billion targeted to tackle the national effects of climate change and improve the health of the country's environment and forests over the next five years by the country's Ministry of Environment and Forests (MoEF).

In the Eighth Five Year Plan (2020- 2025) the Government of Bangladesh has integrated environmental degradation and climate change in the medium-term planning process and identified specific objectives and strategies for environmental protection and climate change.

Bangladesh Climate Change Strategy and Action Plan: The Government of Bangladesh's Vision is to eradicate poverty and achieve economic and social well-being for all the people. This will be achieved through a pro-poor Climate Change Strategy, which prioritizes adaptation and DRR and also addresses low carbon development and mitigation technology transfer.

The Vision 2021 outlines a strategic plan to achieve the government's development vision, mission and goals in advance of the 50th anniversary of Bangladesh's independence. It stresses that by 2021 more substantive measures will be put in place which would enable to mitigate seasonal floods and drought with long term investments in Flood Control and river management, establishment of a Green Belt, use of water resources and ensuring dry season river flows.

The National Sustainable Development Strategy of Bangladesh has also emphasized on Environment, Natural Resource and Disaster Management. One of the primary objectives of this Strategic Priority Area is to ensure environmental protection with due emphasis on conservation, efficient utilization of natural resources and tackling natural disasters and climate change.

The Bangladesh Climate Change Trust Fund (BCCTF) is the first ever national climate fund established by a Least Developed Country and is an example to other countries for institutionalizing national climate finance. The BCCTF funds programs and projects from the national budget to help communities recover and become resilient to climate change impacts.

Bangladesh Delta Plan 2100 Bangladesh in the 21st Century has been prepared by General Economics Division (GED) Bangladesh Planning Commission in view of the long term challenges presented by climate change and natural hazards, the Government has formulated a long term Bangladesh Delta Plan 2100 (BDP 2100).

2.3: Priority Adaptation Actions of Bangladesh

The NDC of Bangladesh (2015) identifies key adaptation areas and more specific adaptation priorities for Bangladesh, as defined in the table below:

i.	Improved early warning system for tropical cyclone, flood, flash flood and drought
ii.	Disaster preparedness and construction of flood and cyclone shelters
iii.	Tropical cyclones and storm surge protection
iv.	Inland monsoon flood-proofing and protection
v.	Climate resilient infrastructure and communication
vi.	Climate resilient housing
vii.	Improvement of urban resilience through improvement of drainage system to address urban flooding
viii.	River draining and dredging (including excavation of water bodies, canals and drains)
ix.	Stress tolerant (salinity, drought and flood) variety improvement and cultivation, including for crops, livestock and fisheries
x.	Research and knowledge management
xi.	Adaptation on local-level perspectives etc.
xii.	Adaptation to climate change impacts on health
xiii.	Biodiversity and ecosystem conservation

xiv.	Capacity Building at individual and institutional level to plan and implement adaptation programmes and projects in the country
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2.4: Climate Change projection and impacts on key sectors

Future climate change projections for Bangladesh are less ambiguous than for many other countries: there is agreement among most models that both temperatures and rainfall will increase significantly. Mean annual temperatures are projected to increase by ca. 1.8°C by 2060s and 2.7°C by 2090s (compared to 2010), while some projections suggest increases up to 4.1°C for 90s (compared to the 1970-2000 mean). Largest increase is projected for dry winter season, where a temperature increase of 4.1°C may occur by 2070s. Southern regions are likely to have a somewhat smaller increase than northern regions: the latter may, in most extreme scenarios, experience an increase of 5.3°C by 2090s, relative to the 1970-2000 mean climate. All projections indicate substantial increases in frequency of days and nights that are considered ‘hot’ in current climate. Annually, projections indicate that ‘hot’ days will occur on 17–39% of days by 2060s.

Bangladesh is expected to be 4% wetter by 2050s. By 2090s, mean annual rainfall is projected to increase by on average 7% compared to 1970-2000 mean climate (although some models project increases up to 24%). Regionally, this increase is expected to be higher in the north and northwest, and lower in the south of the country. The highest increases will take place in the monsoon season (on average 14% by the 2090s) and post-monsoon season (September-November; 17% by the 2070s). For the dry winter season, projections are mixed with some models projecting rainfall decreases and others projecting increases of about 10% by the 2070s. Large increases are expected in 5-day rainfall maxima, especially during the wet season, and an increasing portion of total rainfall will fall during ‘heavy rainfall events’ – indicating a rainfall pattern with more extremes

Although in the last four decades, the agriculture sector has made significant progress in crop production and food insecurity management through agricultural and fiscal interventions in the risk prone areas, these gains could be threatened with worsening climate change associated with extreme hazards as well as with intrusion of saline waters in the coastal areas due to sea level rise.

An increase in global mean temperature can damage or cause irreparable loss of unique and threatened water resources systems⁵. Mean temperature increase can cause agricultural yield losses. Glacial lakes, the Himalayan snow and glaciers and coastal and inland wetlands, may be irreparably harmed by changes in climate beyond certain thresholds. Seventy one percent of the dry season flow of the Ganges originates in Nepal and is mainly from glacier and snow melts. Glacier melt affects the long-term dry season water supply in the Ganges and Brahmaputra, and this will, in turn, impact agriculture and the supporting sectors due to a lack of adequate surface waters. River flows check intrusion of saline water in the coastal districts and water supply in the

rivers in March and April is critical for agriculture in Bangladesh when rainfall is low but the rates of evaporation are high. Recent research findings both from within Bangladesh and from other parts of the world indicate that temperature change can reduce rice yield.

The water sector in Bangladesh will be highly vulnerable to the changes in climatic parameters, namely temperature and precipitation, frequency, intensity and magnitude of extreme events, and rising sea level. Glaciers will continue to shrink in almost all parts of the world (IPCC, 2014). The melting glacier of the Himalayas is a concern for Bangladesh's water supply especially in the dry season. Due to high variability of seasonal water supplies, dry season water is vital to supporting the ecosystem, agriculture and fisheries and navigation. The IPCC (2014) projected 45% and 68% Himalayan glacier loss by 2100 under the RCP4.5 and RCP 8.5 scenarios, respectively. Climate change will cause increased temperature; increased sediment, nutrient, and pollutant loadings from heavy rainfall; increased concentration of pollutants during droughts; and disruption of treatment facilities during floods. All these factors will deteriorate raw water quality and pose risks to drinking water quality even if it is treated by conventional methods (IPCC, 2014). Future rates of sea-level rise are expected to increase coastal flooding, erosion, and saltwater intrusion into surface and ground waters. Increased temperature and higher rates of soil moisture loss could lead to longer and higher impact droughts in the country.

Climate change is expected to increase demand for energy while reducing the ability to meet that demand⁶ Prolonged heat waves and higher average temperatures are expected to drive users to consume more energy for greater lengths of time throughout the year. At the same time, increased frequency and intensity of extreme weather events are also likely to reduce energy supply. Storms, flooding, and high winds can damage power plants, electricity, transmission lines and other energy infrastructure. More extensive or frequent droughts, in addition to changing river flows from increased glacial melt and increased temperatures, are expected to decrease hydropower generation. Bangladesh is currently challenged to meet increased energy demand due to inadequate power production and less efficient power, transmission, and distribution network. Sustained economic growth has further driven an increase in energy demand, yet more than half of households were found to not have access to electricity in 2015 and per capita energy consumption in Bangladesh remains among the lowest in the world. The combination of rising energy demand and increasing risks to supply due to climate change are likely to result in higher energy prices, affecting access for the poor.

A WB study of 2014 estimates – increased salinity in coastal areas would cause increase in road maintenance expenditure by 252%. More frequent/severe flooding of transport infrastructure has been due to more intense rainfall, sea level rise and storm surge. The potential impact of Climate Change would increase number and magnitude of storm surges and/or sea level rise can shorten transport infrastructure life as well.

Higher maintenance and construction costs for roads and bridges due to rise in temperature and

exposure to storm surge. Increased thermal expansion of bridge joints and pavements, potentially causing degradation, due to higher temperatures and heat waves as well as Asphalt degradation and shorter replacement cycles are the critical areas of such potential impact of Climate Change. The implication on the following has been estimated:

- (i)** Culvert and drainage infrastructure damage (intense rainfall, storm surge)
- (ii)** Derailments and longer travel times due to rail buckling during extreme hot days
- (iii)** Disruptions in air traffic, and reduced aircraft performance (range and payload)
- (iv)** Disruptions in port operations and damage to navigational infrastructure

3. Ongoing Climate Resilience Initiatives

GCF supported Community Climate Change Project-Flood (ECCCP-Flood) in Bangladesh. The project is increasing the resilience of poor, marginalized and climate-vulnerable communities in flood-prone areas of Bangladesh.

GCF supported Climate Resilient Infrastructure Mainstreaming (CRIM) project in Bangladesh. The project establishes a national centre of excellence to gather, develop, and share climate resilience infrastructure knowledge. Rural infrastructure development will be supported by constructing 45 new cyclone shelters and renovating 20 existing shelters.

GCF supported Enhancing adaptive capacities of coastal communities, especially women, to cope with climate change induced salinity in Bangladesh. The strengthening of adaptive capacities in this project is projected to reduce the adverse impacts to agricultural livelihoods that are freshwater dependent, and to address the availability and quality of drinking water in vulnerable coastal communities.

LoGIC, a multi-donor collaborative initiative of GoB, UNDP, UNCDF, EU and SIDA, aims to enhance the capacity of vulnerable communities, Local Government Institutions (LGI) and civil society organizations (CSO) for planning and financing climate change adaptation solutions in selected climate vulnerable areas. The Local Government Division (LGD) is the implementing lead of the project in partnership with UNDP and UNCDF.

UNDP has initiated a four year project called 'Integrating Community-based Adaptation into Afforestation and Reforestation (ICBA-AR) Programmes in Bangladesh. The objective of the programme is to reduce climate vulnerability of local communities through participatory planning, community-based management, and integration of climate resilient livelihoods.

4. Need Assessment for Innovations

4.1: Problem Statement

Severe flooding in the low-lying areas that covers over 60% of the country causes loss of life and substantial damages to infrastructure, housing, agriculture and livelihoods. During these floods, it is the poorest and most vulnerable who suffer most because these settlements are often in more exposed locations. River bank erosion is common and causes loss of thousands of hectares of agricultural land and scores of villages, and displace many thousands of people from their homes.

The southern districts of Bangladesh along the Bay of Bengal are prone to severe tropical cyclones, that also generate storm surges and waves. In order to protect people from severe storms and tidal surges, construction of cyclone shelters are key measures along with embankments, afforestation, early warning systems, awareness building and communications.

Droughts in Bangladesh are seasonal and can devastate crops, causing hardship to poor agricultural labourers and others who cannot find work. In these areas, monga (unemployment leading to seasonal hunger) is often a problem, especially in the months leading up to the November-December rice harvest. If the crop totally fails because of drought, the situation for poor people can become critical. Droughts most commonly affect the north- western region, which generally has lower rainfall than the rest of the country. Developing climate change resilient cropping systems (e.g., agricultural research to develop crop varieties, which are tolerant of flooding, drought and salinity, and based on indigenous and other varieties suited to the needs of resource poor farmers), fisheries and livestock systems are necessary to ensure local and national food security.

The Member of Parliament emphasized the need to bring the two DRR and CCA agencies together that can reap tremendous overall benefits as these issues are profoundly fragmented and are dealt in isolation. In this backdrop, the CIC innovation should strive to coordinate the concerned departments under one platform. Besides, the efficient uses of resources are vital and also avoiding duplication in employing resources as well and therefore it requires innovation. Further, it was highly stressed that the disruptive technology under CIC as envisaged would be considered successful when it comprehensively addresses the local needs. The National Adaptation Programme of Action and Bangladesh Climate Change Strategy and Action Plan has accounted for such integration.

Explicit need was demonstrated towards innovative technology for nature-based solution (NbS) for adapting to climate change as it would not only save lives but would also help communities adapt to the vagaries of climate induced disasters. There has been long felt need for strengthening science and technology innovation and cooperation in the areas of nature-based solutions and promote the establishment of institutional environment to facilitate the implementation. The Member of Parliament laid stress for scaling up the nature-based solutions being currently executed in Bangladesh at a small scale. The Government of Bangladesh is

very keen to portray the scaling up of NbS backed by disruptive technology in the COP26 in UK. The National Sustainable Development Strategy of Bangladesh, The Bangladesh Delta Plan (BDP) 2100 and INDC have laid such need for investment that was referred in the consultation.

The crucial need of inculcating innovative technologies that can directly impact women living in highly vulnerable areas to climate change was also highlighted in the consultation meeting. There have been major gaps in the integrating gender in disruptive technologies aiming to solve climate concerns in Bangladesh. There are differential impact of science and technology on the lives of men and women in the country, focusing on a number of sectors, including environment, health, energy, agriculture and indigenous knowledge. Mainstreaming a gender perspective in Technology and Innovation will hence both enhance social equity and bring significant benefits across the economic structure and social fabric. In this backdrop, the participating organizations felt the need to consider such unaddressed gap. The Ministry of Environment and Forest (MoEF) of Bangladesh has produced a national climate change gender action plan that was referred.

4.2: Climate Innovation Needs Assessment

In line with the fulfillment of country's sustainable development goal Bangladesh, with the assistance of UNEP, the Government has undertaken the Technology Needs Assessment (TNA) project which is necessary to reduce the vulnerability of sectors to adverse impacts of climate change. Briefly, the TNA led to the development of Action Plans (TAP) for adaptation which is urgent and focuses on immediate needs of the country and includes water and agriculture sector:

The water sector technology includes;

- (i) Rehabilitation of existing embankments/ dykes and dredging infrastructure development,
- (ii) -Comprehensive disaster management incorporating early warning systems and involving community tidal system and infrastructures management,
- (iii) Monitoring of sea level rise, tidal fluctuation, salinity intrusion, sedimentation and coastal erosion,
- (iv) Tidal river management including computer simulation of tidal flow,
- (v) Tidal barriers (Sluice gate),
- (vi) Urban Infrastructure development.

On the other hand, the agriculture sector technology includes;

- (i) Development of salinity-tolerant rice varieties,
- (ii) Development of drought-tolerant rice varieties,

- (iii)** Development of short-maturing rice varieties,
- (iv)** Establishment of climate-smart Technology Dissemination Center,
- (v)** -Training on improved farming practices for crops, irrigation and water management, soil fertility management (conservation and restoration of soil quality) etc.
- (vi)** Establishment of special agricultural R & D centre and
- (vii)** Land-use planning

5. Stakeholder Consultation on Climate Innovation

Objective of the Consultation

- Explore possibility of co-development of products and tools with the end-users.
- Identify innovation projects that demonstrate regional applicability and scalability.
 - Discuss the innovations and technologies that can be applied in Bangladesh and transferred among SAR countries.
- Familiarize the audience with ADPC and CARE for South Asia project.

5.2: Summary of the Discussion

At the outset, Mr. Rouf M. Abdur, Country Project Lead-CARE for South Asia, Bangladesh thanked everyone for participating in the National Consultation on CIC and delivered introductory remarks. Following the introductory session, Mr. Rouf M. Abdur requested Mr. Aslam Perwaiz (Deputy Executive Director, ADPC) to deliver a short presentation on CIC.

While presenting, Mr. Aslam Perwaiz, Deputy Executive Director of ADPC, laid stress about the innovation themes being explored in the CIC event should aim to bring alignment with the needs of the Bangladesh Government. Besides, most importantly primarily in line with the technology partners in the country-both state owned and private companies in different programs that would also facilitate to avoid in reinventing the wheel.

Mr. Aslam Perwaiz deliberated on variety of focused themes that lays strong emphasis for attuning with certain sectors with the aim of fostering partnerships and awarding grants to the innovators for producing innovative technologies that are potentially scalable. The themes delved into focusing on areas such as climate information and analytics, community level early warning system, climate smart agriculture, Integrated Water Resources Management (IWRM), resilient infrastructure- transport and power, nature-based solutions of adaptation and risk financing solutions.

Mr. Aslam Perwaiz outlined that the innovation being envisaged should demonstrate a demand led product, signifying that if any public sector or private sector willing to apply for this grant, should ensure to bring local partnership. He further added that ADPC is also co-developing projects and tools with the end users and in collaboration with the Bangladesh Meteorological Department they are selling them the idea related to advance developments in early warning systems (EWS). The key objective would be to

co-develop with Bangladesh Meteorological Department that would enable them in using the efficacy of such EWS within the context of the country. Further to it, Mr. Perwaiz explained that grants geographical coverage that would be awarded based on regions and countries.

Mr. Saber Hossain Chowdhury, Member of Parliament & Chairman, Parliamentary Standing Committee on Ministry of Environment, Forest and Climate Change delivered his keynote address. In his keynote address he welcomed the launching of CIC by ADPC with support from World Bank Group in Bangladesh offering a great opportunity for young innovators to experiment their ideas and solutions for achieving climate resilience. Bangladesh has emerged as one of the promising leaders in building resilience to climate and also in disaster risk reduction and responding to disasters in the world.

Drawing parallels between the pandemic and climate change, Mr. Chowdhury stated that in the situation of COVID19 various vaccination medical companies are available to ramp up vaccination manufacturing as and when required. However, in the case of climate change there would not be any such vaccination available for each individual in future, as a result it reveals that climate change would bring a massive convulsion for the humanity in future.

Focusing on nature-based solution (NbS) and local-level technology for adapting to climate change would not only save lives but would also help communities adapt to the vagaries of climate induced disasters. Mr. Chowdhury laid stress for scaling up nature-based solutions being currently executed in Bangladesh at a small scale. In order to avoid fragmentation, duplication and making efficient use of resources, Mr. Chowdhury suggested to dovetailing climate change adaptation and disaster risk reduction. It is necessary to bring together disaster risk reduction and climate change adaptation communities in such climate resilience innovative technologies. In this sequence, it was also discussed in a length that disruptive technology only becomes successful when it addresses local needs.

Mr. Aslam Perwaiz, highlighted the essential mechanism for appreciating the innovation needs of countries in South Asia prior to inviting innovators for submitting their proposals. He further added that subsequent to carrying out a series of needs assessment consultations in South Asia, ADPC will launch call for proposals. This call for proposal would provide opportunity to each eligible and qualifying innovator to access a maximum of US\$150,000 to pilot their innovations regionally and/or in their selected countries.

Towards the concluding session, participants from different Ministries and Departments acknowledged the support of ADPC and also for the funding support by the World Bank Group in organizing the National Consultation on CIC in Bangladesh.

5.3: Outcome of the National Consultation

- It was broadly agreed upon in the consultation that Climate innovation should include a gender component reflecting the representation of women into IT outsourcing in compliance to the suggestion by Mr. Chowdhury. In the same line, on the topic of protecting women group through disaster risk reduction measures, Mr. Perwaiz underscored the role of CIC in addressing the issue of gender mainstreaming by way of innovative solutions that can largely benefit in ensuring climate resiliency of women.

The crucial need of inculcating innovative technologies that can directly impact women living in highly vulnerable areas to climate change was also highlighted in the consultation meeting. In this backdrop, the participating organizations felt to consider such unaddressed gap and subsequently suggested to incorporate the Ministry of Women and Children Affairs and other relevant Ministry of Information and Communication Technology, and the Ministry of Social Welfare in the stakeholder list of CIC.

During the consultation Mr. Chowdhury made a commitment to allocate unutilized “Innovation Fund” budget amounting to BDT 1,000,000,000 that was passed through parliament last year to the CIC project that can be clubbed together in the CIC execution. ADPC deeply acknowledged the commitment of BDT 1,000,000,000 by Mr. Chowdhury that would also contribute towards ensuring co-ownership of the CIC in the country.

One crucial suggestion also emanated in the consultation to additionally include the Ministry of Environment, Forest and Climate Change by Mr. Chowdhury as including such more key relevant Ministries would vastly contribute in exploiting untapped resources, knowledge exchange etc. as well as ensuring wider impact from the CIC project outcomes. Furthermore, he outlined that critical need for CIC’s extensive coverage in mainstream media that would result into raising awareness among innovators for applying to the grants.

6. Key Recommendations

The Climate Innovation Challenge for Bangladesh would potentially aim to bridge the gap for investments in innovation in those sectors that are most vulnerable to climate change, namely the water resources, agriculture and energy, planning and transport. However, considering the enormity of the investment needs, it lays a strong emphasis to forge partnerships and collaboration across the South Asia region to (i) understand existing technologies that may be replicated and applicable in another SAR country without needing to reinvent the wheel; and (ii) co-develop and share technological innovations that require higher investments considering the economies of scale. As envisaged, with the purpose to steer this collaborative initiative, ADPC’s role as a facilitator is crucial in this collective and collaborative climate innovation initiatives.

The country benefits from a very active sector of non-governmental and community-based organizations (NGO`s, CBO`s) who are implementing a number of projects addressing climate change in Bangladesh. In developing and implementing adaptation technologies a range of stakeholders are involved, including research, private sector, financial institutions, NGOs and communities. Models of their collaboration can significantly impact adaptation technology development and implementations towards better outcomes.

In the Eighth Five Year Plan (2020- 2025) activities to be undertaken to address the Climate Change highlights the need for increased partnership with the NGOs and Civil Society. Measures for adaptation to climate change require community wide cooperation, which emerges from partnerships with different stakeholders such the civil society. Such partnerships allow community-based adaptation measures to gain efficiency by building a participatory process facilitating improved coordination and knowledge sharing at the local levels. In TNA Report, Government recognizes that tackling climate change requires an integrated approach involving many different ministries and agencies, civil society and the business sector.

The World Bank funded Community Climate Change Project (CCCP) has awarded grants to around 41 NGOs to address salinity, flood and drought-prone areas. With the help from local NGOs, communities to innovate simple solutions to cope up with changing climate and earn a better living benefiting at least 40,000 people in the most vulnerable districts.

The Gobeshona consortium is a multi-institutional knowledge management and sharing platform on climate change research in and on Bangladesh. Gobeshona Sub-group on Adaptation Technology is a coalition of organizations and individuals who are active in research and development focusing on climate change.

Bangladesh Rural & Advancement Committee the world's largest NGO, in terms of members, has decided that climate change must be factored into all its operations to make its work possible.

Network on Climate Change in Bangladesh (NCC,B), a non-political voluntary organization, is working to (represent) the voice (ideas and beliefs) of the vulnerable on climate change issues at local, national and international levels. Over the period of time, NCC,B has widened its network and now it is a countrywide network of 18 member organizations

In addition quite a few local organizations working on Climate Change in Bangladesh and connected through Climate Networking Organizations like Southern Voices on Climate Change, Climate Action Network South Asia (CANSA) etc. Over the period of time, extensive capacity building to these local CSOs have been carried out to collaborate on joint research studies, implementation projects, and regional knowledge-sharing programmes, grant application and shared fundraising opportunities.

In this backdrop, considering that ADPC places much emphasis on investing in community resilience, the grant challenge initiative is a good opportunity to build innovations in community resilience by engaging civil society organizations and grassroot communities and placing the emphasis of the grant challenge in continuing the opportunities for CSOs to engage with communities as all as working on technological innovations is both timely and appropriate. Such key potential CSOs

needs further handholding by ADPC in terms of honing their capacity that would enable them in making grant application.

Despite the strength of CSOs, academic institutions and communities in delivering effective community services, they lack such technical capacities in grant writing and subsequently can emerge as strong contender to diverse funding opportunities available. With the purpose to fill such crucial gap, it essentially calls for providing technical guidance to the civil society organizations by ADPC and its country partners in demystifying and simplifying innovative concepts and ideas and translating them into actionable proposals and programs.

Considering the nature of grant ceiling, there are untapped opportunities for agencies and entities to collaborate, co-develop and generate innovations through startups and disruptive technologies engaging the youth, CSOs, academic institutions and communities to gain a comparative advantage of the CIC grants.

Besides innovations, investments in research have always been a necessity to look at solutions to climate challenges in the sectors most vulnerable to climate change.

Opportunities

A key component of adaptation is technology. Technology can help protect society from changing climate conditions, improve productivity, and help in the more efficient use of threatened resources such as water. It is crucial to identify a number of existing and emerging technologies that can help Bangladesh adapt to climate change. The objective encompasses in identifying and analyzing adaptation technologies that can ameliorate the potential adverse impact of climate change. In this context, CIC is intended to address the barriers that impede developing countries from the transfer, development and deployment of climate innovations.

Development benefits define climate change adaptation technologies, which offer the greatest value to Bangladesh in meeting its current national development priorities. Implementation potential defines scale of implementation and diffusion of the technology, which can be realistically achieved if key barriers are overcome. Contribution to climate change response goals defines technologies, which will make the biggest contributions to the country's efforts for facilitating adaptation to climate change that will contribute to the country's effort to undertake and implement the climate-resilient development strategies and actions. Based on the assessment of innovation needs, ADPC identified key thematic areas focusing on partnerships, applicability and scalability of innovations and technologies. Areas of innovation may be one or all of the following:

- (i) Community – level-early warning systems
- (ii) Agriculture and Food Security
- (iii) Bio-diversity and ecosystems.
- (iv) Health 5. Infrastructure
- (v) Renewable Energy

- (vi) Water
- (vii) Forestry
- (viii) Cyclone preparedness

Subsequent to the questions and answers session, the following themes for innovative technology were suggested for some of the major sectors in Bangladesh:

7. Annexes

Annex-1: Key Stakeholders Consulted

Sl. No.	Name	Designation/ Organization
01	Mr. Saber Hossain Chowdhury	Member of Parliament, Bangladesh Awami League
02	Mr. Md. Hafizur Rahman	Joint Secretary, World Bank Wing, Economic Relations Division, MoF
03	Mr. Md. Hasan Maruf	Joint Secretary, Economic Relations Division, MoF
04	Ms. Afrina Islam	Deputy Secretary, Economic Relations Division, MoF
05	Ms. SyedaMasuma Khanam	Deputy Secretary, Economic Relations Division, MoF
06	Mr. Mantu Kumar Biswas	Former Additional Secretary, Planning Wing, Ministry of Water Resources
07	Mr. Md. Mahmud Hasan	Deputy Secretary, Ministry of Water Resources
08	Mr. Abdullah Al Arif	Deputy Secretary, Ministry of Disaster Management and Relief
09	Dr. Md. Shah Kamal Khan	Project Director, AMeISDP, Component-C of Bangladesh Weather and Climate Services Regional Project
10	Dr. Md. Rafiqul Islam	Upazila Livestock Officer (L/R Post), Department of Livestock Services (DLS)
11	Mr. A.K.M. Luthfur Rahman	Additional Chief Engineer & Director, Climate Resilient Local Infrastructure Centre (CRoLIC), LGED
12	Mr. Sohrab Ali	Project Director, Rural Transport Improvement Project-2, Local Government Engineering Department (LGED)
13	Mr. Md. Atiqul Huq	Director General, Department of Disaster Management
14	Ms. Annesha Das Hasi	Executive Engineer, Environment Division, Roads and Highways Department
15	Mr. Raihanul Haque Khan	Country Program Lead, RIMES
16	Mr. Sajib Hasan	National IT Expert, RIMES
17	Mr. Md. Arman Akon	National Parliament
18	Mr. NajmusSakib	Reporter, The Financial Express
19	Ms. Natasha Naureen Rahman	Knowledge Management Officer, ADPC
20	Mr. Muhammad Hasan Faisal Bhuiyan	Country Representative, ADPC Country Office, Bangladesh

21	Mr. Rouf Mohammad Abdur	Country Project Lead, CARE for South Asia, ADPC Country Office, Bangladesh
22	Mr. Mohammad Assaduzzaman	Climate Policy and Planning Specialist, CARE for South Asia, ADPC Country Office, Bangladesh
23	Mr. Adil Hassan	Water Resources Management Specialist, CARE for South Asia, ADPC Country Office, Bangladesh
24	Mr. Md. Asadul Hoque	Resilient Agriculture Specialist, CARE for South Asia, ADPC Country Office, Bangladesh
25	Dr. Imran Hasan	Livestock Specialist, CARE for South Asia, ADPC Country Office, Bangladesh
26	Ms. Sk. Naureen Laila	Resilient Transport Specialist, CARE for South Asia, ADPC Country Office, Bangladesh
27	Mr. Md. Emon Kabir Noyon	Project Coordinator, CARE for South Asia, ADPC Country Office, Bangladesh
28	Mr. Md. Sohidujjaman Rony	Finance and Admin Coordinator, ADPC Country Office, Bangladesh
29	Mr. Md. Alauddin	Office Assistant, ADPC Country Office, Bangladesh



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