CTCN Technical Assistance
Request Submission Form

Please fill in the form in the grey spaces, by following the instructions in italic.

Requesting country:	*Bangladesh*

Request title:	*Technology for Monitoring & Assessment of Climate Change Impact on Geo-morphology (Sea level rise/fall, Salinity,Sedimentation etc) in the Coastal Areas of Bangladesh*

Contact information:

{Please fill in the table below with the requested information. The request proponent is the organization that the request originates from, if different from the National Designated Entity (NDE).}

	National Designated Entity	Request Applicant
Contact person:	**Md. Raisul Alam Mondal**	*Md Saiful Hossain*
Position:	*Director General*	*Superintending Engineer*
Organization:	*Department of Environment, Government of Bangladesh.*	*Processing Flood Forecasting Circle, Bangladesh Water Development Board*
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Technology Needs Assessment (TNA):

{Select one of the three boxes below:}

☒ *The requesting country has conducted a TNA* in October 2012

☐ *The requesting country is currently conducting a TNA*

☐ *The requesting country has never conducted a TNA*

{If the requesting country has completed a TNA, please indicate what climate technology priority this request directly relates to. Please indicate reference in TNA/TAP/Project Ideas.}

This request relates to the water sector that prioritizes infrastructure development, tidal system and infrastructures management. The technologies that it relates to are:

1) Monitoring of sea level rise, tidal fluctuation, salinity intrusion, sedimentation and coastal erosion

2) Tidal river management including computer simulation of tidal flow

CTCN Request Incubator Programme:

{Please indicate if this request was developed with support from the Request Incubator Programme:}

☒ *Yes*

☐ *No*

Geographical focus:

{Select below the most relevant geographical level for this request:}

☐ *Community-based*

☒ *Sub-national*

☐ *National*

☐ *Multi-country*

{If the request is related to the sub-national or multi-country level, please indicate here the areas concerned (provinces, states, countries, regions, etc.)}

Theme:

{Select below the most relevant theme(s) for this request:}

☒ *Adaptation to climate change*

☐ *Mitigation to climate change*

☐ *Combination of adaptation and mitigation to climate change*

Sectors:

{Please indicate here the main sectors related to the request. e.g. energy, industry, transport, waste, agriculture/fisheries, forestry, water, ecosystem/biodiversity, coastal zones, health, education, infrastructure/human settlement, tourism, businesses, early warning/disaster reduction, institutional design and mandates, cross-sectorial}

Water, agriculture/fisheries, forestry, coastal zones, infrastructure/human settlement, early warning/disaster risk reduction.

Problem statement *(up to one page):*

{Please describe here the difficulties and specific gaps of the country in relation to climate change, for which the country is seeking support from the CTCN. Please only provide information directly relevant to this request, and that justifies the need for CTCN technical assistance.}

It is globally accepted that Bangladesh is a frontline country vulnerable to serious climate change impacts. Bangladesh also has very high population density overall in the country, and in the coastal areas as well. Being vulnerable to regular water and climate induced disasters like cyclones, storm surges, floods, droughts, and inundation by saline water, the threat of climate change looms large affecting the economy and livelihood of the people. Evidences over the years indicate that climate change impact would result in sea level rise along the coasts of Bangladesh, the depth, duration and

intensities of floods would increase; the droughts would be prolonged, cyclones would be more frequent; salinity intrusion from the sea would be more severe. It is essential to put in place appropriate technical measures to monitor the changes due to climate change. There is not a single offshore platform along the coast of Bangladesh to regularly monitor actual sea level rise over time. Measuring water salinity and soil salinity needs lot of technological inputs and updating. Impact of climate change in different sectors need to be studied in depth over time and space. Above all how climate change is going to affect our lives and livelihoods need to be clearly understood. For these, the country needs to be well equipped advanced technological capacity.
The present request has to explore the need for expansion of knowledge and identify the gaps for monitoring and impact assessment for the following:

Water Resources and Hydrology:

In a high population density country like Bangladesh, the effects of climate change on the surface and ground water resources will be very severe and alarming. Changes to water resources and hydrology will have a significant impact on the country's economy, where people mostly depend on the surface water for irrigation, fishery, industrial production, navigation and similar other activities.

Agriculture and Fisheries:

The economy of Bangladesh is based on Agriculture mainly, with two thirds of the population engaged (directly or indirectly) on agricultural activities. So, the overall impact of climate change on agricultural production in Bangladesh would be wide spread and devastating for the country's economy. Beside, other impacts of Climate Change such as - Extreme Temperature, Drought, and Salinity Intrusion etc. are also responsible for the declining crop yields. Temperature and Rainfall changes have already affected crop production in many parts of the country and the area of arable land has decreased to a great extent. The salinity intrusion in the coastal area is creating a serious implication for the coastal land that were traditionally used for rice production.

The fisheries sector has also experienced an adverse affect because of the impacts of climate change. The fisheries sector contributes significantly to the GDP in Bangladesh and people depend on fish products in order to meet up majority of their daily protein requirements. There are a large number of species of fish in the country and almost all the varieties are sensitive to specific salt and freshwater conditions.

Coastal Areas:

Almost one fourth of the total population of the country live in the coastal areas of Bangladesh, where majority of the population are someway affected (directly or indirectly) by coastal floods / tidal surges, water logging due to obstruction in sediment flow, river-bank Erosion, saline water intrusion, and destructive cyclones.

Forestry / Biodiversity:

Bangladesh has got a wide diversity of ecosystems including mangrove forests at the extreme south of the country. The "Sundarbans" a world heritage, is the largest mangrove forest in the world, comprising 577,000 ha of land area along the Bay of Bengal. Climate change impacts will have negative effects on the ecosystem of the forest recourses in Bangladesh while the Sundarbans is likely to suffer the most.

Particular attention is needed for the following:
1. The impacts of climate change are diversified covering a large area. There is need for a tool that can

monitor and analyze changes in the ground as a result of climate change.
2. Absence of long term data on offshore and climate related parameters.
3. Absence of practical scientific data to base the analyses of sea level rise and other climate change related phenomenon.
4. Seasonal changes in the salinity intrusion
5. Morphological changes in the coastal areas, within the polders due the changes in the hydrologic regime of the coastal rivers and the sediment flow both inside and outside the polders due to the construction of coastal embankments,
6. Changes in the ecosystem including forest cover,
7. Analyses of tide gauge data to assess sea level trend,
7. Climate change impact on the coastal economy, overall livelihood including fishing livelihood.

Past and ongoing efforts *(up to half a page):*

{Please describe here past and on-going processes, projects and initiatives implemented in the country to tackle the difficulties and gaps explained above. Explain why CTCN technical assistance is needed to complement these efforts, and how the assistance can link or build on this previous work.}

Bangladesh is one of the most severely affected countries due to climate change and the coastal areas of the country have to face the onslaught in the first instance the catastrophic affect of sea level rise, cyclones, storm surges, and saline water intrusion. These create havoc resulting in loss of lives and livelihoods of almost all the people living in the coastal areas together with destruction of their dwellings and whatever economic assets they have, and the coastal ecology. A recent study conducted with a small survey on the livelihood impact due to climate change that included analyses of the impact of climate change on employment, income and occupation, chronic illness and vulnerability in the coastal areas, climate change related risks faced by the coastal families, social implications of climate variability, economic implications of climate variability, loss of seasonal crops, climatic variability and domestic animal, climatic variability and forced internal migration, occupational hazards, and risks and challenges. The study concluded that "Climate change related hazards lead to multifarious risks and posed multiple threats on the communities. Climate change induced disasters destroy livelihood options and increase peoples' vulnerabilities. There are various elements of vulnerabilities associated with current climate variability. Due to extreme weather the climate change affected people are unable to perform their agro-based productions and face other occupational risks. Among the coastal people unemployment appears as a common phenomenon. Though the climate change affected people do not want to move from their residences, climate induced disasters force them to migrate outside of village in search of works. Like unemployment, food scarcity, health problem, water crises have been identified as major challenges in the coastal belt of Bangladesh. "

There are numerous studies reported by the Climate Change Cell of The Ministry of Environment and Forests that assessed the impact of climate change in the coastal areas. But the analyses in the studies were mostly based on secondary sources of data. A review of past studies that will relate to this request are on :

(a) Investigating the Impact of Relative Sea-Level Rise on Coastal Communities and their Livelihoods in Bangladesh,
(b) Development and climate change in Bangladesh: Focus on coastal flooding and the Sundarbans.
(c) Where land meets the sea – A Profile of the Coastal Zone of Bangladesh

There are other studies conducted by NGOs on

(a) Social mobilization and policy advocacy to mitigate the recurrent environmental crisis of water-logging in the southwest coastal region in Bangladesh. The project dealt with disaster risk Reduction (DRR) in an innovative way. The core thrust was on community based river basin management to reduce the risk factors related to environmental disasters that happened in the region for more than a decade. Synergy between indigenous knowledge along with

academic knowledge is important for any sustainable plan. That was why Institute of Water Modeling (IWM) and Centre for Environment and Geographic Information Services (CEGIS) were involved with the people's plan. IWM and CEGIS have contributed their scientific expertise to validate the technical soundness and environmental viability of the plan envisaged in the report. The plan was developed with community consultations throughout the eleven river basins in the region.

(b) Climate change vulnerability of drinking water supply infrastructure in coastal areas of Bangladesh was presented in a report in 2015 by CEGIS, and IUCN. This study made very good suggestions on technical aspects for adaptation to meet the needs of drinking water supply. But still there is no methodology to monitor the changes in fresh water quality, and projections on the intrusion of saline water. Implications of climate change and various adaptation measures on other aspects of climate change were proposed in another study sponsored by Practical Action.

The above mentioned few studies though useful in the application of the climate change assessment technology that is expected to result from this request, but are not adequate to provide a comprehensive knowledge base to assess existing conditions and project future scenarios that are needed to develop adaptation related programmes.

Models so far used in Bangladesh for inundation due to sea level rise and the intrusion of saline water that can be useful as a tool need to be integrated in the overall framework of the impact assessment with the data from satellite imagery.

Bangladesh Inland Water Transport Authority operates a few tide gauges in the river and seaports of Bangladesh. An attempt can be made to develop the trend of sea level rise after removal of the tidal fluctuation, but still it will be affected by seasonal variations of water level, and influence of bottom topography. These data at present are mainly used for the design of coastal engineering structures.

Assistance requested *(up to one page):*

{Please describe here the scope and nature of the technical assistance requested from the CTCN and how this could help address the problem stated above and add value vis-à-vis the past and on-going efforts. Please note that the CTCN facilitates technical assistance and is not a project financing mechanism.}

The assistance is mainly intended to enable Bangladesh to make periodic assessment of the changes that are taking place in the coastal areas and enhance the knowledge base for climate change related phenomenon to assess the impacts of climate change so that appropriate strategies and actions can be proposed for implementation. Due to the specific characteristics of the coastal areas of Bangladesh that has evolved with the construction of the series of sea facing and inward coastal polders, the monitoring mechanism has to be developed in a macro scale for the large offshore areas, a somewhat with a higher resolution for the sea facing polders to enable assessment of the impact on the coastal structures, and with further higher resolutions to enable assessment of the morphology, salinity, and changes to the physical conditions within the polders. The following assistance are expected to support achieving the above objectives:

1. Use of satellite imagery for periodic monitoring and impact assessment,
2. Setting/linking up with offshore mechanism to monitor the sea level rise through satellite,
3. Development of analytical tools to monitor and assess the parameters susceptible to climate change,
4. Development of numerical model(s) for impact assessment using the satellite and sea level rise data, and other information collected on the ground,
5. Sea level processing software for analyzing tide gauge data for use in assessing trend of sea

level changes along the coastline by expanding the present monitoring system,
6. Application of tools/software developed or identified for demonstration purposes in one of the coastal polders,
7. Establish in-country capacity building and training that can be institutionalized to continue the above mentioned objectives over long term.

Expected benefits *(up to half a page):*

{Please outline here the medium and long-term impacts that will result from the CTCN technical assistance, including how the assistance will contribute to mitigate and/or adapt to climate change.}

The benefits would be tremendous as they would
- Ensure an acceptable data-base as well as bench mark figures,
-With uniform impact assessment and monitoring technologies there will be very little scope of misunderstanding and misinterpretation about the data type and quality,
- Real time field monitoring and analysis dependent on those will increase acceptability of the different findings by the relevant experts,
- The modeling system and climate change impact assessment would improve greatly,
- This will boost up the national aspiration to get a very clear picture about the possible impacts of climate change, their intensities and extents. Based on these studies Bangladesh can develop its action oriented climate change adaptation strategies.
- Satellite transmission system of data will be in place within the reach of many.

Post-technical assistance plans *(up to half a page):*

{Please describe here how the results of the CTCN technical assistance will be concretely used by the applicant and national stakeholders, to pursue their efforts of resolving the problems stated above after the completion of the CTCN intervention (list specific follow-up actions that will be undertaken).}

Post technical assistance plan will require identification of institutional capacity needs to support implementation of the project proposal resulting from this request, and provision of its financing. The NDE together with the UNFCCC focal point will prepare a request for Government approval and its submission to funding agencies through the focal point of Global Climate Fund.

Key stakeholders:

{Please list in the table below the main stakeholders who will be involved in the implementation of the requested CTCN technical assistance, and what their role will be in supporting the assistance (for example, government agencies and ministries, academic institutions and universities, private sector, community organizations, civil society, etc.). Please indicate what organization(s) will be the main/lead counterpart(s) of CTCN experts at national level, in addition to the NDE.}

Stakeholder	Role to support the implementation of the assistance
National Designated Entity (NDE)	*Will submit the proposal to CTCN after having it reviewed by its technical committee.*
Department of Environment (DoE) *Bangladesh Unnayan Parishad*	*Will provide organizational and technical support to NDE*
Processing & Flood Forecasting Circle	*Will initiate the proposal and send it to NDE. Act as*

(PFFC), BWDB	*the main counterpart of CTCN in addition to NDE.*
Institute of Water Modelling (IWM,) CEGIS and Regional Integrated Multi-hazard Early Warning System (RIMES)	*Will provide technical support to PFFC, FFWC and NDE for implementation. Act as the lead technical counterpart of CTCN.*
Local Government Institutions (LGIs)	*Will provide relevant support to implement the activities at the field level.*

Alignment with national priorities *(up to half a page):*

{Please demonstrate here that the technical assistance requested is consistent with documented national priorities (examples of relevant national priorities include: national development plans, poverty reduction plans, technology needs assessments (TNAs), LEDS, NAMAs, TAPs, NAPs, sectorial strategies and plans, etc.). For each document mentioned, please indicate where the priorities specifically relevant to this request can be found (chapter, page number, etc.).}

The Government and the people of Bangladesh are committed to achieve the Sustainable Development Goals (SDGs). It is the policy of the nation to ensure equitable distribution of growth and development in every part of the country. The coastal belt in the past had not received much of attention. But now that attention would need to be enhanced. This project will provide a major impetus to the development efforts of the Government.

- A sustainable development pathway that is resilient to disaster and climate change; entails sustainable use of natural resources; and successfully manages the inevitable urbanization transition. (7th Five Year Plan, page 36)

- Infrastructure to ensure that existing assets (e.g., coastal and river embankments) are well-maintained and fit-for-purpose and that urgently needed infrastructure (e.g., cyclone shelters and urban drainage) is put in place to deal with the likely impacts of climate change. (BCCSAP 2009, Page XVIII)

- Research and knowledge management to predict the likely scale and timing of climate change impacts on different sectors of economy and socioeconomic groups; to underpin future investment strategies, and to ensure that Bangladesh is networked into the latest global thinking on science, and best practices of climate change management. (BCCSAP 2009, Page XVIII)

Development of the request *(up to half a page):*

{Please explain here how the request was developed at the national level and the process used by the NDE to approve the request before submitting it (who initiated the process, who were the stakeholders involved and what were their roles, and describe any consultations or other meetings that took place to develop and select this request, etc.)}

A National Consultation Meeting was held on 21 January 2016 to develop the request. The process was initiated by the NDE as the major stakeholder with the organizational and technical support of Bangladesh Unnayan Parishad and the Asian Institute of Technology. A CTCN representative from their regional office in Bangkok was also present to provide guidance in formulation of the requests. Other participants were LGED, Water partnership, JICA, BRAC University, Bangladesh Meteorological Department, Bangladesh University of Engineering and Technology, Ministry of Agriculture, and number of NGOs.

This was followed by bilateral discussion related to specific aspect of this request.

Expected timeframe:

{Please propose here a duration period for the assistance requested.}

1 year (One Year)

Activities	**Months**				
	1-2	2-3	3-6	6-9	9-12
1. Need assessment/literature review, identify the activities					
2. Methodology, development and selection of technology. Identification of and user/sectors.					
3. Technology transfer, training and implementation					
4. Reporting, user engagement and evaluation					

Background documents:

{Please list here relevant documents that will help the CTCN understand the context of the request and national priorities. For each document, provide weblinks if available, to attach to the submission form while submitting the request. Please note that all documents listed/provided should be mentioned in this request in the relevant question(s), and that their linkages with the request should be clearly indicated.}

- M.H. Minar, M. Belal Hossain and M.D. Shamsuddin, 2013. Climate Change and Coastal Zone of Bangladesh:Vulnerability, Resilience and Adaptability. Middle-East Journal of Scientific Research 13 (1): 114-120, ISSN 1990-9233

- Impact Assessment of Climate Change and Sea Level Rise on Monsoon Flooding, 2009. Climate Change Cell Department of Environment, Ministry of Environment and Forests, Component 4b Comprehensive Disaster Management Programme, Ministry of Food and Disaster Management Bangladesh.

-Assessment of Vulnerability to Climate Change and Adaptation Options for the Coastal People of Bangladesh, 2008. Practical Action, Bangladesh.

-Bangladesh Integrated Water Resources Management: Final Report, 2014. A Report Prepared by CSIRO, WARPO, BWDB, IWM, BIDS and CEGIS for the Development of Foreign Affairs Australia Aid- CSIRO Research for Development Alliance

- Climate Change Vulnerability of Drinking Water Supply Infrastructure in Coastal Areas of Bangladesh, 2015. IUCN (International Union for Conservation of Nature), Bangladesh Country Office

- Linta Rose and Prasad K. Bhaskaran, 2015. Tidal Prediction for Complex Waterways in the Bangladesh Region. International Conference on Water Resources, Coastal and Ocean Engineering (ICWRCOE 2015).

- Shardul Agrawala, Tomoko Ota, Ahsan Uddin Ahmed, Joel Smith and Maarten van Aalst, 2003. Development and Climate Change in Bangladesh: Focus on Coastal Flooding and the Sundarbans.

Organisation for Economic Co-operation and Development (EOCD).
COM/ENV/EPOC/DCD/DAC(2003)3/FINAL

-People's Plan of Action for Management of Rivers in South-West Coastal Region of Bangladesh, 2013. Study conducted by Uttaran, Paani Committee, CEGIS and IWM.

- Mohammed Abdul Baten, Lubna Seal and Kazi Sunzida Lisa, 2015. Salinity Intrusion in Interior Coast of Bangladesh: Challenges to Agriculture in South-Central Coastal Zone. American Journal of Climate Change, 4, 248-262

Monitoring and impact of the assistance:

{Read carefully and tick the boxes below.}

☐ By signing this request, I affirm that processes are in place in the country to monitor and evaluate the assistance provided by the CTCN. I understand that these processes will be explicitly identified in the Response Plan in collaboration with the CTC, and that they will be used in the country to monitor the implementation of the CTCN assistance.

☒ I understand that, after the completion of the requested assistance, I shall support CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term impacts in the country.

Signature:

NDE name:	**Raisul Alam Mondal**
Date:	10.10.2016
Signature:	

THE COMPLETED FORM SHALL BE SENT TO THE CTCN@UNEP.ORG

Need help? The CTCN team is available to answer questions and guide you through the process of submitting a request. The CTCN team welcomes suggestions to improve this form.

>>> Contact the CTCN team at ctcn@unep.org