CTCN Technical Assistance

Request Submission Form

Guidelines:

- This Request Submission Form should be completed by the organisation requesting technical assistance from the Climate Technology Centre & Network (CTCN) in collaboration with the National Designated Entity (NDE) of the country in question
- The Form must be signed by the NDE. Please see updated contact list of NDEs here: http://unfccc.int/ttclear/support/national-designated-entity.html
- The Form can be submitted as a Word file containing a digital signature or as a signed and scanned PDF file in combination with an un-signed Word file
- For requests submitted by multiple countries, all the NDEs of the respective countries shall sign identical Forms before official submission to the CTCN
- NDEs have the opportunity to submit CTCN requests in collaboration with National Designated Authorities (NDAs) for the Green Climate Fund (GCF) if targeting the GCF Readiness Programme.

Requesting country or countries:	Belize
Request title:	Groundwater Monitoring for Managing Aquifers in Belize as a tool for climate-change adaptation
NDE	**Dr. Lennox Gladden** National Climate Change Office, Ministry of Sustainable Development, Climate Change and Disaster Risk Management Market Square, City of Belmopan coord.cc@environment.gov.bz
Request Applicant:	**Dr. Lennox Gladden** National Climate Change Office, Ministry of Sustainable Development, Climate Change and Disaster Risk Management Market Square, City of Belmopan coord.cc@environment.gov.bz

Climate objective:

- ☒ Adaptation to climate change
- ☐ Mitigation of climate change
- ☐ Combination of adaptation and mitigation of climate change

Geographical scope:

- ☐ Community level
- Sub-national
- ☒ National
- ☐ Multi-country

If the request is at a sub-national or multi-country level, please describe specific geographical areas (provinces, states, countries, regions, etc.).

Problem statement related to climate change (up to one page):

Belize is located in Central America and is exposed to the risk of rising sea levels and increasing frequency and intensity of tropical storms. Climate change and climate variability does not only affect groundwater quantity but also its quality. Rising sea levels can flood areas of coastal agricultural land and drives the salinization of groundwater.

These events can reduce the amount of fresh water and the availability for utilization especially in rural areas where the demand of water is provided mainly (95%) from ground water.

In Belize, 56% of the population lives in rural areas where the main source of water is ground water. In 2018, 9.4% of the land area was dedicated ton agriculture and 23% of the active population works in agriculture. Each year during low rainy seasons there are possibility of droughts due to low recharge of aquifers.

Quality assessment of the water sources and its dynamics is a key aspect in order to handle the impacts of climate change and increase the resilience of the communities where groundwater is relevant. The increased demand for fresh water projected by population increase, economic growth (mainly agricultural, industrial and domestic/residential) and agricultural expansion will increase pressure for resources.

Groundwater is also used as a source of drinking water in the communities and towns of the Corozal, Orange Walk, Cayo and Toledo Districts and in some rural areas of Toledo and Cayo. However, the existing aquifers and their annual recharge rate have not been quantified.

The management of ground water resources requires specialized knowledge; therefore, capacity building and exchange of experiences and lessons can be valuable for the local institutions and communities.

Past and on-going efforts to address the problem (up to half a page):

This section should answer the question "what has been done or is currently being done to address the problem?" Please describe past and on-going processes, projects or initiatives implemented in the country or region to tackle the climate problem as described above.

According to data from the Ministry of Natural Resources, hydrological monitoring in Belize began in 1965 with the agricultural assessment of the Belize River Valley. Since the 1980's, the entity which is responsible for hydrological and water resources information for the country is the National Hydrological Service (NHS), a Government Unit in the Ministry of Natural Resources, Petroleum and Mining.

Belize has 18 major water basins in all the territory and has 3 transboundary water aquifers. The main demand of water comes from agriculture, tourism, and industry. There is low land utilization for agriculture and there is potential in rural areas for tourism.

The NHS has conducted an assessment on prior work of water wells in the northern part of the country. There was evidence of absence of a conceptual hydrological model and some key hydrological elements such as water quality, water flow, sampling devices and institutional framework. This assessment

reported on the low availability of information on water quality, aquifer properties, rainfall and evapotranspiration.

The NHS expressed an interest to help draft a Climate Change Adaptation Technology Factsheet on groundwater resource monitoring for the northern Districts, as a basis for a Drought Early Warning System for stakeholders in this drought-prone region of the country.

The NHS is leading a process for building an inventory of existing data on groundwater. The objective is to identify and homogenize information that is currently available but, spread among different agencies and institutions, and their various departments.

Recently, universities and organizations have developed campaigns for citizens about awareness of the serious lack of access to clean water.

Other factors reported as an issue in water is the transboundary aspect and the population distribution in the country, for example the central and northern regions (Orange Walk and Corozal) have much larger populations, agriculture zone for water intensive crops and much less water resources.

Belize's First, Second, and Third National Communication to the UNFCCC assessed the vulnerability of certain productive sectors to the impacts of climate change. These sectors were considered as potential areas for technology interventions. These included: Energy, Transport, Agriculture, Land Use Change and Forestry, Water, Coastal and Marine Ecosystems, Human Settlements, Human Health, Tourism, Forestry, and Terrestrial Ecosystems.

Specific technology[1] barriers (up to one page):

This section should answer the questions "what are the technology barriers that hinder national efforts described above" and "how will the CTCN technical assistance complement these efforts?" Building upon the problem statement and taking into consideration the existing efforts described above, please describe the specific technology barriers encountered by the requesting applicant to identify, assess or deploy climate technology(ies) in an effort to address the problem statement. The described barriers should be within the scope of the requested CTCN technical assistance (described in the section below).

The climate change and variability events can affect the access to clean water due to the reduction of the availability of water because of intensification of the hydrological cycle, saltwater intrusion into coastal aquifers, sea level rise and impact of hurricane seasons. The impacts can produce water scarcity.

In the long term the growth of economic activities would demand more resources which will increase the pressure over the water. So, the management of the resource is critical for the sustainability of the activities.

However, the lack of the monitoring system to properly assess the water sources and low capacity developed in institutions and communities are barriers to overcome for better management of the resources. Specifically, northern Belize is more challenging in terms of level of information and

[1] *"**any equipment, techniques, practical knowledge and skills** needed for reducing greenhouse gas emissions and adapting to climate change" (Special Report on Technology Transfer, IPCC, 2000)*

management of future water resources under climate change, thereby increasing the vulnerability of water sources.

The results of the prioritization of adaptation technology factsheets for the Water Sector documented in technologies needs assessment for adaptation (2017) are:

- Drought Monitoring System for Northern Belize with Specific Focus on Groundwater Resources
- Water Efficient Fixtures and Appliances
- An Integrated Management Strategy for Water Safety for Eight Rural Water Supply Systems in Belize

Currently, the NHS is interested in drafting a Climate Change adaptation technology factsheet on groundwater resource monitoring focused for the northern Districts.

Sectors:

Please indicate the main sectors related to the request:

☐ Coastal zones	☐ Early Warning and Environmental Assessment	☐ Human Health	☐ Infrastructure and Urban planning
☐ Marine and Fisheries	☒ Water	☐ Agriculture	☐ Carbon fixation
☐ Energy Efficiency	☐ Forestry	☐ Industry	☐ Renewable energy
☐ Transport	☐ Waste management		

Please add other relevant sectors:

Cross-sectoral enablers and approaches:

Please indicate the main cross-sectoral enablers and approaches

☐ Communication and awareness	☐ Economics and financial decision-making	☒ Governance and planning	☐ Community based
☐ Disaster risk reduction	☐ Ecosystems and biodiversity	☐ Gender	

Technical assistance requested (up to one page):

Founded on the problem statement, past/on-going efforts and technology barriers, please describe the requested technical assistance. The technical assistance should clearly contribute to mitigation or

adaptation to climate change as described in the problem statement and contribute to overcome the specific technology barriers.

Within a clearly defined scope, the description of technical assistance should be structured into the following:

- *Overall objective*
- *Anticipated groups of activities to be performed by the technical assistance*
- *Anticipated products to be delivered by the technical assistance.*

Please note that the CTCN facilitates technical assistance and is not a project financing mechanism.

Objective

Design a groundwater quality monitoring system and identify risks for the supply of water for diverse groundwater users in Belize.

Group of activities

In order to identify activities to address the situation identified some activities are defined

Analysis of groundwater offer and demand in a prioritized region based on the available technical information

- Preliminary assessment of groundwater situation: Baseline analysis indicating issues, trends in demand, economic activities and sustainable practises in management and quality of water.
- Mapping information and existing data about hydrologic features/characteristics of the basins from the different agencies and institutions
- Analysis of the current and projected economic activities and the water demand related with groundwater sources
- Establish criteria to define a region or basin where the quality water monitoring and vulnerability of groundwater sources. Consultation with related agencies and institutions

Design of the assessment of water availability including water quality monitoring

- Identification of the main issues related with potential contamination from natural or economic process, seasonal shortage of water and growth of the demand by all economic activities
- Definition of information needs in quantity and quality water resources that needs to be addressed, as basis of design criteria for the monitoring and assessment system
- Defining monitoring objectives considering different users and data needs including topics as uses of the land and nature conservation
- Design features of the monitoring and evaluation of water quality programme and vulnerability

Analysis about political and technical instruments at national and regional levels about planning/management/ quality monitoring of water resources

- Analysis of institutional setting: identification of key stakeholders and their responsibilities and synergies
- Identify and prioritize areas to be monitored based water management criteria (basins and sub-basins) - according with the national plans of adaptation
- Define required institutional capacity supporting monitoring objectives
- Specification of required budgets for each option of monitoring objective

- Propose a financing strategy and design a concept note for the monitoring programme implementation
- Dissemination of technical assistance results and capacity building workshops with relevant entities in the sector

Products:
- Preliminary assessment of groundwater situation
- Report of vulnerability of the groundwater sources derived by natural process and growth economic activities
- Design features of the monitoring and evaluation of water quality programme and vulnerability
- Guides and training materials used in workshops
- Concept note for the monitoring programme implementation

Expected timeframe:

The expected duration of this technical assistance is 12 months.
The detailed schedule will be defined with the national designated entity later on.

Anticipated gender and other co-benefits from the technical assistance:

Please describe the activities with gender linkages as well as the anticipated gender and other co-benefits (e.g. biodiversity, economic, social, cultural, etc.) that are likely to be generated as a result of the technical assistance.

For more information you can find guidelines on the CTCN's website here:
https://www.ctc-n.org/technologies/ctcn-gender-mainstreaming-tool-response-plan-development

Further reading on gender can be found on the CTCN website here:
https://www.ctc-n.org/technology-sectors/gender

Some co-benefits are identified from the technical assistance:

- The activities of capacities building can impact the persons from rural areas developing skills and empowering people about water management governance

- The design of water monitoring system will support national objectives about clean water access for communities and adaptation actions in water conservation

- Women involved in rural activities in agriculture and tourism can be part of the courses and training about adaptation, water quality and actions to be more resilient. 56% of the population lives in rural areas where the main source is groundwater.

- Control of water contamination can have positive impact in biodiversity, human health, and downstream water including beaches and coastal ecosystems, which include mangroves, seagrass beds, and coral reefs

- Water monitoring system can impact in better control of contamination which can propel the tourism activities, which can have positive economic impacts on poverty reduction and promote gender equity.

Key stakeholders:

Please list the stakeholders who will be involved in the implementation of the requested CTCN technical assistance and describe their role during the implementation (for example, government agencies and ministries, academic institutions and universities, private sector, community organizations, civil society, etc.).

Stakeholders	Role to support the implementation of the technical assistance
National Designated Entity and Request Applicant National Climate Change Office, Ministry of Sustainable Development, Climate Change and Disaster Risk Management	Request of the cooperation and national focal point Political support and communication of the needs and opportunities
National Hydrological Service	General coordination and liaison with other stakeholders related with water utilization and environmental issues Exchange of information about hydrology and political issues in water management Integrate outputs in publications of hydrological & water resources information for water users Participation in capacity building activities
Ministry of Tourism and Diaspora Relations	Inputs about groundwater demand and projections in the tourism in rural areas and sustainability Participation in capacity building activities
Ministry of Health and Wellness	The water quality testing is carried out by the Public Health Bureau to operate the system and ensuring that the water is of potable quality Participation in capacity building activities
Ministry of Agriculture, Food Security, and Enterprise	Synergies with planning of sectorial activities in adaption and water utilization Participation in capacity building activities
Department of Rural Transformation	Provision of data on supply of potable water in rural areas, such as information on water demand at the domestic level with commercial quantities; there are hotels, resorts that are connected to rural water systems Participation in capacity building activities

Belize Water Services Limited	Provision of data on water supply in some villages, water supply to some urban areas for which groundwater is the source, and water demand. Participation in capacity building activities

Alignment with national priorities (up to 2000 characters including spaces):

Please describe how the technical assistance is consistent with national climate priorities such as: Nationally Determined Contribution, national development plans, poverty reduction plans, technology needs assessments, Low Emission Development Strategies, Nationally Appropriate Mitigation Actions, Technology Action Plans, National Adaptation Plans, sectorial strategies and plans, etc.

<table>
<tr><th>Reference document</th><th>Extract</th></tr>
<tr><td>Nationally Determined Contribution (NDC), 2016

https://unfccc.int/files/focus/ndc_registry/application/pdf/belize_ndc.pdf</td><td>Section 4. Adaptation, page 12
<table>
<tr><th>Priority sectors</th><th>Main actions to be implemented to build resilience</th></tr>
<tr><td>Water resources</td><td>Design and implement an IWRM programme in watersheds; enhance protection of water catchment (including groundwater resources); develop water conservancy management systems; conduct water resource assessment (especially groundwater); develop flood controls and drought monitoring; improve trans-boundary cooperation regarding water resources; strengthen the human resource capacity in the water sector strengthen the compliance monitoring capacity of staff; undertake water policy reform.</td></tr>
</table>
Synergies with adaptation actions in tourism and agriculture</td></tr>
<tr><td>Draft updated Nationally Determined Contribution (NDC), 2021</td><td>Section 7, Adaptation: Water Resources
<table>
<tr><th>Type</th><th></th><th>SDG linkages</th></tr>
<tr><td>Target</td><td>Enhance the protection of water catchment (including groundwater resources) areas and make improvements to the management and maintenance of existing water supply systems through implementation of the National Water Sector Adaptation Strategy and Action Plan</td><td> 
</td></tr>
</table></td></tr>
</table>

	Action	Design and implement groundwater hydrological monitoring network to inform drought monitoring activity	
	Action	Develop flood controls and drought monitoring (including both meteorological and hydrological drought) including an early warning system for flooding	
	Action	Design and implement an integrated water resources management (IWRM) program in watersheds to reduce the impacts of climate change, including the establishment of an IWRM agency	
	Action	Establish a national water quality monitoring program, coordinated by a national water quality task group and including monitoring activities for national coastal and ground water areas	
Technology Needs Assessment - Adaptation, 2017 https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TNA_key_doc/3db7d7bbba4c4deebecbc11fd		*Chapter 4: Technology Prioritization for the Water Sector, Section 4.3 Overview of Existing Technologies in the Water Sector, page 98* "Database on water supply and demand, leakage and customer service information is an example of a technology that can be replicated at the national level for the management of both surface and groundwater resources."	

24fb67d/5331353e87a0488e861d1fe6aca1b747.pdf	"The lack of information regarding groundwater, especially in northern Belize leads to a difficulty in the management of future water resources under climate change and increases the vulnerability of communities"
BELIZE TECHNOLOGY NEEDS ASSESSMENT – MITIGATION: Identification and Prioritization of Mitigation Technologies for Belize, taken from the Belize Growth and Sustainable Development Strategy 2016-2019	Critical Success Factor 3: *Sustained or Improved Health of Natural, Environmental, Historical and Cultural Assets*; Necessary Condition 3.1.2: Water Resources; Action 4: "Complete a Water Master Plan, a National Ground Water and Surface Water Assessment, and a Water Vulnerability Profile"
National Adaptation Strategy to address Climate Change: Water Sector (2009)	This national adaptation strategy aims to address the impact of climate change on water resources in Belize, namely for agricultural, industrial and domestic/residential purposes. This strategy outlines five key adaptation actions, which include the establishment an agency to execute integrated water resources management; strengthening the existing institutional and human resources capacities in the water sector for improved management practice, formalizing the legal mandate and operations of the National Climate Change Committee, strengthening the trans-boundary relationships to cover the impacts of climate change on the water sector; and increasing public awareness and education in water culture and climate change.
Add others here as relevant	

Development of the request (up to 2000 characters including spaces):

Please describe 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.

The idea for the project arose from discussions between the National Climate Change Office of the Ministry of Sustainable Development, Climate Change, and Disaster Risk Management and the National Hydrological Service.

The National Hydrological Service expressed an interest to help draft a Climate Change adaptation technology factsheet on groundwater resource monitoring for the northern Districts, as a basis for a Drought Early Warning System for stakeholders in this drought-prone region of the country.

Additionally, the CTCN LAC office was consulted to formulate this request.

Background documents and other information relevant for the request:

- *Please list all relevant documents that will help the CTCN analyse the context of the request and national priorities. Please note that all documents listed/provided should be mentioned in this request in the relevant section(s), and that their linkages with the request should be clearly indicated. For each document, please provide web-links (if available) or attach to the submission form. Please add any other relevant information as required.*
- *Please indicate if this request has been developed with the support of the CTCN Request Incubator.*

Assessment of Groundwater Resources in the Southern Coastal Water Province of Belize Referred to as Savannah Groundwater Province Available in:
https://info.undp.org/docs/pdc/Documents/BLZ/GM_Belize_InceptionReport_11HJ.pdf

Technology Needs Assessment Climate Change Adaptation Report Belize 2017

Technology Needs Assessment Climate Change Mitigation Report Belize 2017
https://tech-action.unepdtu.org/wp-content/uploads/sites/2/2017/12/belize-tna-mitigation-141217.pdf

IGRAC. 2012. Online database at http://www.igrac.net/ International Groundwater Resources Assessment Centre

Growth and Sustainable Development Strategy (GSDS) for Belize
https://observatorioplanificacion.cepal.org/sites/default/files/plan/files/BelizeGSDS.pdf

OPTIONAL: Linkages to Green Climate Fund Readiness and Preparatory Support

The CTCN is collaborating with the GCF in order to facilitate access to environmentally sound technologies that address climate change and its effects, including through the provision of readiness and preparatory support delivered directly to countries through their GCF NDA. These actions are in line with the guidance of the GCF Board (Decision B.14/02) and the UNFCCC, particularly paragraphs 4 and 7 of 14/CP.22 that addresses Linkages between the Technology and the Financial Mechanisms[2].

The CTCN is therefore implementing some of its technical assistance using GCF readiness funds accessed via the country's NDA. Any application for GCF support, including the amount of support provided, is subject to the terms and conditions of the GCF and should be developed in conjunction with the NDA.

Please indicate whether this request has been identified as preliminarily eligible by the NDA to be considered for readiness support from the GCF.

☐ Initial engagement: The GCF NDA of the requesting country has been engaged in the design of this request and the NDA will be involved in the further process leading to an official agreement for accessing GCF readiness support.

[2] Please see:
https://unfccc.int/files/meetings/marrakech_nov_2016/application/pdf/auv_cop22_i8b_tm_fm.pdf

☐ Advanced engagement (preferred): The GCF NDA of the requesting country has been directly involved in the design of this request and is a co-signer of this request, the signature indicating provisional agreement to use readiness national funds to support the implementation of the technical assistance.

NDA name:

Date:

Signature:

Monitoring and impact of the assistance:

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

NDE name:	Dr. Lennox Gladden
Date:	July 27th, 2021
Signature:	

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

The CTCN is available to answer all questions and provide guidance on the application process.