Technical Assistance Response Plan – Terms of Reference

Country	Belize
Request ID#	2021000037
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
Proponent	**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

Summary of the CTCN technical assistance

Due to its geographical location, Belize is exposed to climate change and variability events that can affect the access to clean water. In addition, the growth of economic activities would demand more resources, which will lead to an increased pressure over water availability. This is particular problematic for rural areas and towns and communities that depend on groundwater to cover their freshwater demand.

The management of water 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.

The National Climate Change Office of the Ministry of Sustainable Development, Climate Change and Disaster Risk Management, and the National Hydrological Service of the Ministry of Natural Resources, Petroleum and Mining, are joining efforts for this TA to develop a groundwater monitoring system for the management of aquifers in Belize.

The technical assistance is to design a groundwater monitoring system useful for the National Hydrological Service and government agencies in Belize to identify risks for the water supply for diverse groundwater users in Belize. The final outcome is to control the impacts of groundwater abstraction and contaminant loads to Belize aquifers though monitoring aquifers response and quality trends.

Key deliveries are: Assessment of groundwater availability and demand, mapping of aquifers in the prioritized areas, benchmark the existing methodologies for groundwater monitoring, design of the monitoring system including a suggested implementing plan and an operational framework, a financing strategy of the full monitoring system, concept not for the system implementation, and a manual for capacity building.

It will be established a Stakeholder Working Group to provide technical overview and high-level guidance at each stage of technical assistance development.

Agreement:

(If possible, please use electronic signatures in Microsoft Word file format)

National Designated Entity to the UNFCCC Technology Mechanism

Name: Dr. Lennox Gladden
Title: Chief Climate Change Officer, National Climate Change Office, Ministry of Sustainable Development, Climate Change and Disaster Risk Management
Date: October 8th, 2021

Signature: 

Proponent (signature of the Proponent is optional)

Name: Dr. Lennox Gladden
Title: Chief Climate Change Officer, National Climate Change Office, Ministry of Sustainable Development, Climate Change and Disaster Risk Management
Date:

Signature:

UNFCCC Climate Technology Centre and Network (CTCN)

Name: Rose Mwebaza
Title: CTCN Director
Date:
Signature:

1. Background and context

In Belize, 56% of the population lives in rural areas where groundwater is a vital source for fresh water, and represents almost 95 per cent of the fresh water supply.

Groundwater is also used as a source of drinking water in the cities 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.

Increase in demand for fresh water resulting from increasing population, greater economic activity and agricultural expansion are threatening the quality and availability of fresh water. Each year during low rainy seasons exists the possibility of droughts due to low recharge of aquifers.

Transboundary aspects and distribution of population are other factors that affect the water sector. For example, central and northern regions (Orange Walk and Corozal) have much larger populations and higher agriculture zones for water intensive crops, but less water resources.

Although there is a need for groundwater information across the country, the priority area include the New River watershed.

The Nationally Determined Contribution (2016)[1] indicated water resource assessment (especially groundwater) as part of the main actions to be implemented to build resilience.

The results of the prioritization of adaptation technology factsheets for the Water Sector documented in the technologies needs assessment (TNA) for adaptation (2017)[2] include:

- 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

The National Hydrological Service (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. Requests have been made from the executive level of the Ministry (responsible for the NHS) to other ministries for sharing of relevant groundwater data. However, this is still a work in progress. Additionally, the Ministry of Rural Transformation has indicated that they do not geo-reference their wells.
Following the foreseen adaptation actions in the NDC and the TNA for Adaptation for the water sector, the National Climate Change Office of the Ministry of Sustainable Development, Climate Change, and Disaster Risk Management, and the National Hydrological Service (NHS) started conversations to develop a proposal for a Groundwater Monitoring System.

[1] Belize's Nationally Determined Contribution, 2016
https://unfccc.int/files/focus/ndc_registry/application/pdf/belize_ndc.pdf
[2] Technology Needs Assessment for Adaptation, 2017
https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TNA_key_doc/3db7d7bbba4c4deebecbc11fd24fb67d/5331353e87a0488e861d1fe6aca1b747.pdf

2. Problem statement

Belize is located in Central America and is exposed to climate change and variability events can affect the access to clean water due to intensification of the hydrological cycle, saltwater intrusion into coastal aquifers, sea level rise and impact of hurricane seasons.

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.

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 and agricultural expansion will increase pressure for resources.

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.

Therefore, designing a monitoring system for managing groundwater is the first step towards addressing future problems related to water availability. Additionally, capacity building and knowledge transfer on groundwater management represent valuable actions to assure the correct implementation of a monitoring system.

3. Logical Framework for the CTCN Technical Assistance:

(Guidance: Please note that multiple activities lead to one Output, and multiple Outputs lead to one Outcome. There can be several Outputs, but only one Outcome description capturing the CTCN technical assistance. Deliverables are the products or services to be delivered to the NDE/Proponent/CTCN based on the Activities and the Outputs.)

	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
***Objective**:* Design a groundwater monitoring system useful for the National Hydrological Service and government agencies in Belize to identify water supply risks for diverse groundwater users in Belize												
Outcome: Control the impacts of groundwater abstraction and contaminant loads to Belize aquifers though monitoring aquifers response and quality trends												
Mandatory output: All implementers must undertake the following activities at the beginning and at the end of the CTCN technical assistance.												
Activity i) A detailed work plan of all activities, deliveries, outputs, deadlines and responsible persons/organisations, and detailed budget to implement the Response Plan. The detailed work plan and budget must be based directly on this Response Plan; Activity ii) Based on the work plan, a monitoring and evaluation plan with specific, measurable, achievable, relevant, and time-bound indicators used to monitor and evaluate the timeliness and appropriateness of the implementation. The monitoring and evaluation plan should apply selected indicators from the Closure and Data Collection report template and enable the lead implementer to complete the CTCN Closure and Data collection report at the end of the assignment (please refer to item iv below and section 14 in the Response Plan); Activity iii) A two-page CTCN Impact Description formulated in the beginning of the technical assistance and updated/revised once the technical assistance is fully delivered (a template will be provided); Activity iv) A Closure and Data Collection report completed at the end of the technical assistance (a template will be provided).												
Deliverables: i) Detailed work plan and budget ii) Monitoring and evaluation plan iii) CTCN Impact Description iv) Closure and Data Collection report	X											X
Output 1: Map Stakeholders and establish a Stakeholder Working Group												
Activity 1.1 Stakeholders mapping The activity will identify relevant stakeholders among government institutions at national and community levels, such as representatives of water management offices, institutions that collect hydrological, climatological and meteorological data/information, representatives of groundwater user sectors, as well as women and youth.												

The identification of main stakeholders will be supported by the NDE and the National Hydrological Service of the Ministry of Natural Resources, Petroleum and Mining. The final groups of relevant stakeholders will be presented in a report in which each actor will be linked to its sector of expertise, person of contact and contact details.												
Activity 1.2 Establish a Stakeholder Working Group (SWG) Of the stakeholders identified in Activity 1.1, a restrictive working group (up to 8 persons), chaired by the National Hydrological Service, will be created (Stakeholder Working Group). It will provide a technical overview and high-level guidance at each stage of technical assistance development. The members of the restrictive working group should have the capacity to make sound decisions on some key aspects of the technical assistance, such as the identification of available information, definition of the monitoring area, objectives, needs, the selection of technologies to collect, analyze and storage of data on a regular basis, and effective management of the monitoring system to be developed. The composition of the Stakeholder Working Group will be summarized in a report, disaggregated by gender.												
Activity 1.3 Conduct an inception meeting Once the Stakeholder Working Group (SWG) is created, an inception meeting will be held with the SWG, the NDE or his representatives, the Team Leader, and international experts and national experts. It is expected that this meeting will be held on-site in Belize. The objective of this inception meeting is to introduce the team of experts, the goals, milestones, anticipated deliverables and the role of the stakeholder working group. Results of the inception meeting will be fed into the implementation plan elaborated under Activity i of the Mandatory Output.												
Deliverables:												
1.1 Report on stakeholder mapping	X											
1.2 Detailed description of the stakeholder working group, with name and contact details of the members	X											
1.3 Minutes of the inception meeting including a list of participants disaggregated by gender and meeting materials	X											
Output 2: Assess groundwater availability and demand based on the available technical information												
Activity 2.1: Inventory of information and existing data on hydrologic features/characteristics of the basins from the different agencies and institutions												
Activity 2.2: Baseline analysis indicating issues, trends in demand, economic activities and sustainable practices in management and water quality in Belize This activity includes the analysis of primary information sources (e.g. studies on socioeconomic activities and existing inventory of aquifers in Belize) and surveys and/or interviews to groundwater users. This activity will be												

supported by the Stakeholder Working Group for the identification of information sources and actors for the application of surveys and/or interviews. It is expected that this activity will provide clarification on, among other things: • water well pump installations • water-use inventories or alternatively land-use inventories • population registers and forecasts • energy consumption for irrigation												
Activity 2.3: Analysis of the current and projected economic activities and the water demand on groundwater sources i) This activity will identify the main issues related with potential contamination from economic processes, seasonal shortage of water and increase in groundwater demand by all economic activities ii) This activity will provide clarification on, among other things, use projections of groundwater resources demand in the short and medium term, and potential pressure factors on their availability and quality due socioeconomic activities iii) Study on gender considerations in the groundwater demand. For example, the role of women in the use and transport of groundwater and triggers of vulnerability												
Activity 2.4: Map the groundwater resources of Belize in the prioritized area of the New River watershed It is expected that this result will be achieved based on resistivity and high density induced polarization mapping, by use of mobile equipment which provide 3D maps of aquifers. However, the implementer can propose alternative approach and methodology with practical examples or illustration relevant to the project. This mapping will assist the government in estimating the quantity and quality of ground water and assess the sustainable level of ground extraction. This activity will be done in Belize, in the presence of the international relevant team of experts. The results of the 3D aquifer mapping will be explained in a detailed report including the process that was used to generate the 3D aquifer mapping, the presentation of the maps with their key explanations, as well as some conclusions that could be taken based on these results.												
Deliverables:												
2.1 Assessment of groundwater availability and demand in Belize (Findings in Activities 2.1, 2.2 and 2.3)		X										
2.2 Detailed report on the 3D mapping of aquifers in the prioritized area of the New River watershed			X									
Output 3: Design a fully integrated groundwater monitoring system that will enable Belize to manage groundwater resources in the two priority areas Groundwater monitoring can be defined as the scientifically-designed, continuing measurement and observation of the groundwater situation. It includes evaluation and reporting procedures. The monitoring system will describe the data on groundwater to be collected at a set of locations and at a regular time interval.												
Activity 3.1: Defining the area to be monitored												

The area to be monitored should be defined on hydrological or hydrogeological criteria. The river basin, groundwater flow system or aquifer should be the scale for which the monitoring system will be designed.												
Activity 3.2: Defining information needs This activity is a basis for managing the quantity and quality of groundwater. It implies deciding who (from a broad range of stakeholders) wishes or requires to be informed about groundwater, what types of information they need and for what purposes. It also requires consideration of the issue of what format they might require the information to be provided in to meet their various purposes, and how accurate and quickly the different stakeholders require the information. Information needs must be specified in sufficient detail so that design criteria for the monitoring and assessment system can be derived. This activity implies consultation with the Stakeholder Working Group.												
Activity 3.3: Defining monitoring objectives considering different users and data needs including topics such as uses of the land and nature conservation The groundwater monitoring system needs to be adjusted to the data needs of data-users. This activity implies consultation with the Stakeholder Working Group. Users may be governmental institutions, local water boards, universities or private companies. The selected monitoring objectives and specific data needs will have to be translated into the properties of the monitoring programme (set-up and density of the network, selection of parameter sets and frequency of observation). Include gender considerations in the objectives definition.												
Activity 3.4: Benchmark and select the most suitable groundwater monitoring technologies During this activity, the implementer will benchmark the existing methodologies for groundwater monitoring, including among other things, groundwater observation wells, groundwater pumping wells, springs and surface water observation points, as well as tools for water quality monitoring. Each technology will be described in a factsheet providing fundamental information such as costs, quality of data captured and other benefits and disbenefits. Based on the results of the assessment of groundwater availability and demand (Output 2), as well as the definition of information needs, monitoring objectives, costs, and climate and hydrological data available in Belize, the implementer will prioritize the existing technologies and select the one(s) that would be more suitable to Belize. The prioritization criteria for the selection of the best technology will be defined and explained in a report, and a matrix of the results will be made.												

Activity 3.5: Organize a virtual workshop to share similar experiences in the region and a meeting with the Stakeholder Working Group to discuss the characteristics of the groundwater monitoring system. It is expected that this meeting will be held on-site in Belize. i) The implementer will identify and invite relevant cases to showcase in a virtual workshop with the SWG and the NDE for sharing experiences of groundwater monitoring in the Caribbean region or other countries with similar monitoring needs. The objective is bringing inspiring successful cases and lessons learned, and generating spaces for potential south-South cooperation opportunities. 3 or 4 cases will be showcased. ii) The implementer will organize a half day meeting with the SWG to discuss and present the results of activity 3.4. At the end of the meeting, it is expected that the groundwater monitoring system to be implemented will be approved and selected in a consensual way with all the members of the SWG. Procure a balanced representation of women and men												
Activity 3.6: Design a groundwater monitoring system Once the system characteristics that seem the most suitable for Belize have been approved by the Stakeholder Working Group and the NDE, the implementer will design the different components of the system, including but not limited to the: - Monitoring stations (amount and location) - Parameters to be monitored (including data format) and monitoring frequency - Technologies for each monitoring objective - Access to data - Data analysis and treatment - Evaluation procedures - Reporting procedures such us generation of regular bulletin - Communication channels (how would the information be released, who will access it) The design of this system will be detailed in a report along with an expected implementation plan. The implementation plan will describe the resources required for the development and implementation of the monitoring system, as well as the entity/ies and person(s) responsible at each step, and monitoring frequency. Also, as part of the design in Activity 3.6, it is expected the implementer will propose a framework for the use of the monitoring system. This framework will clarify the roles and responsibilities of the different agencies involved, and the rights of the administrators and other users.												
Activity 3.7: Organize a virtual meeting with the SWG and the NDE to present the groundwater monitoring system and the implementation plan. During the first half of the day, the implementer will organize a full day meeting with the Stakeholder Working Group and the NDE to present the design of the groundwater monitoring system and the expected implementation plan. Some adjustments could be made. The implementer will incorporate suggested amendments from the SWG												

and NDE and resubmit the groundwater monitoring system and the implementation plan, for approval. This is important as the implementer will need to connect the monitoring information to the existing database of Belize. It is also important that the framework for the operationality of the monitoring system be discussed and amended if necessary until it gets approved by the stakeholders. Procure a balanced representation of women and men												
Deliverables 3:												
3.1 Minutes of the meeting to discuss the selection of the groundwater monitoring system to be deployed in Belize and the accompanying implementation plan, and evidence of approval of both by the SWG and NDE					X			X				
3.2 Benchmark the existing methodologies for groundwater monitoring, factsheets and results of the prioritization criteria assessment					X							
3.3 Report with design features of the monitoring system including a suggested implementing plan and an operational framework								X				
Output 4: Enabling factors for implementation: financing, institutional settings and capacity building												
Activity 4.1: Specification of required budgets for each monitoring objective Based on the design made in Activity 3.6, the implementer will analyze the cost of the development, implementation, operation and maintenance of such a system should it be implemented at the scale of Belize. It includes capital cost (of network installation), sampling costs (for instrumentation, personnel and logistics) and analytical costs (for laboratory, data processing and storage).												
Activity 4.2: Propose a financing strategy considering national self-funds, private sector participation and climate finance funds alternatives, and design a concept note for the option of climate finance funds. The concept note may be discussed with the stakeholder working group; approval is to be received from the NHS and NDE.												
Activity 4.3: Analysis of institutional setting: identification of key agencies, their responsibilities, synergies and possible limitations in the implementation of the groundwater monitoring system												
Activity 4.4: Explore the feasibility of a gradual approach in the monitoring implementation, and provide insight on labour and costs involved at each stage and the final design and realization of a gradual monitoring programme.												
Activity 4.5: Training with relevant entities in the sector The administrators and users of the groundwater management system will be trained during training on-site in Belize; this will be a combination of theoretical and practical field training (if necessary). The in-person training will be coordinated and implemented by the implementer (team leader and international and national experts). During this training, the implementer will explain the methodologies and procedures of the system, the role of each participant, how to approach each implementation stage in case of a gradual implementation, as well as the maintenance, updates in the system design, and procedures and tools for information analysis and storage. The implementer will also deliver two manuals of use summarizing all the steps that need to be followed to implement the monitoring system												
Deliverables 4:												

4.1 Cost analysis and financing strategy of the full monitoring system										X		
4.2 Concept note that will support Belize in accessing the financing to implement the designed system										X		
4.3 Proposal for a gradual approach in the monitoring implementation including the needed institutional setting											X	
4.4 Report on stakeholder training sessions, including list of participants disaggregated by gender, materials used for the session, and photos.												X
4.5 One manual for capacity building in administrators and users of the groundwater monitoring system. Digital versions and 30 printed copies of the manual												X

4. Resources required and itemized budget:

Please provide an indicative overview of the resources required and itemized budget required to implement the CTCN technical assistance, including for M&E-related activities, using the table below. Important to note that minimum 1% of the budget should explicitly target gender specific activities related to the technical assistance (please see section 10 for further information on gender). Once the Response Plan is completed, a Response Implementation partner(s) will be selected by the Climate Technology Centre (CTC). A detailed activity-based budget for the CTCN assistance will be finalized by the CTCN and selected Implementer.

Activities and Outputs	**Input: Human Resources** *(Title, role, estimated number of days)*	**Input: Travel** *(Purpose, national vs. international, number of days)*	**Inputs: Meetings/events** *(Meeting title, number of participants, number of days)*	**Input: Equipment/Material** *(Item, purpose, buy/rent, quantity)*	**Estimated cost** *Please accumulate the costing at Activity and Output level and provide an estimated costing range for each activity and the total Response Plan*	
					Minimum	**Maximum**
Mandatory output: All implementers must undertake the following activities at the beginning and at the end of the CTCN technical assistance.	*TL 6* *I1 2* *I2 2* *I3 2* *N1 1* *N2 1*	*None*	*None*	*None*	7,800	9,200

Output 1: Map Stakeholders and establish a Stakeholder Working Group	*TL 10* *I1 1* *I2 1* *I3 1* *N1 12* *N2 9*	*International trip for the team leader and 3 international experts, and local trip for national experts and SWG members to attend the inception meeting (around 5 local trips)*	*Inception meeting with the Stakeholder Working Group*	*None*	23,900	27,300
Output 2: Assess groundwater availability and demand based on the available technical information	*TL 19* *I1 29* *I2 29* *I3 0* *N1 18* *N2 9*			*None*	54,300	64,700
Output 3: Design a fully integrated groundwater monitoring system that will enable Belize to manage their groundwater resources	*TL 25* *I1 29* *I2 29* *I3 5* *N1 15* *N2 15*	*International trip for the team leader and international experts (3), and local trip for national experts and SWG members to attend the discussion meeting on the groundwater monitoring system (around 5 local trips)*	*Meeting with the SWG to discuss the characteristics of the groundwater monitoring system*	*None*	71,600	83,400
Output 4: Enabling factors for implementation: financing, institutional	*TL 17* *I1 10* *I2 10*	*International trip for the team leader and international experts*	*Capacity building workshop with relevant entities in the sector*	*Manual*	55,900	64,300

settings and capacity building	*I3 26* *N1 11* *N2 10*	*(3), and local trip for national experts to attend the capacity building workshop with relevant entities in the sector*				
Estimated range of costing for the entire Response Plan					213,500	248,900

5. Profile and experience of experts (see recommendation in excel file): Implementer

Based on the required Human Resources identified in section 4 (Resources required and itemized budget) please provide a description of the required profile of all involved experts for the implementation of the CTCN Response Plan.

Experts required	Brief description of required profile
Team Leader (TL) and Adaptation Expert -Water sector	Hydrologist, economist, engineer, ecologist, or related with M.Sc. in sustainability and/or water resources management or related areas. Minimum 20 years of professional work experience. Minimum 15 years of experience in the design, and implementation of national monitoring systems for climate change adaptation measures with focus on water monitoring. Experience in the area of climate change and SDG. Demonstrable knowledge of the role and content of NDCs. Work experience with public entities, private sector and international cooperation. Experience in coordinating highly complex projects that involve the management of interdisciplinary work teams and the consultation of different types of actors. Experience in group work and different participatory methodologies. Work experience of at least 3 years in the Caribbean, or Latin America. Fluency in English.
International Expert in Groundwater monitoring (I1)	Engineer, hydrologist, geologist or related, preferably with postgraduate studies in water resource management or related area, with more than 10 years of experience in groundwater monitoring. Work experience in studies of vulnerability of water basins, flood early warning systems, surface water monitoring, and water use rights desirable. Experience in the implementation of national and/or local policies and action plans in the water sector. Demonstrable knowledge of the monitoring equipment and technics uses and impacts on the groundwater sources. Demonstrable knowledge of the political framework on climate change in Belize, its NDC and Adaptation Plan. Experience in the systematization of processes and elaboration of highly complex reports that involve consultation of different types of actors. Group work experience and different participatory methodologies. Work experience of at

	least 3 years in the Caribbean, México or Central America (working experience in the Yucatán region is a plus). Advanced level of English.
International Hydrologist (I2)	Engineer, hydrologist, geologist or related preferably with postgraduate studies in water resource management or related area, with more than 10 years of experience in water management systems with focus on groundwater. Work experience conducting hydrological, geological, and climatological studies and assessing current and future water availability of aquifers. Experience in the development of national projects involving different actors and stakeholders. Working experience of at least 3 years in the Caribbean, México or Central America (working experience in the Yucatán region is a plus). Advanced level of English.
International Expert in financial analysis (I3)	Economist, administrator, professional in finance, or similar. With advanced studies in projects finance evaluation or similar. Minimum 10 years of professional experience. With experience in international climate financing mechanisms and formulation of financial strategies and concept notes to access various climate funds and formulation and/or monitoring of Public-Private Partnerships. Experience in environmental financing mechanisms such as incentives, taxes, among others. Work experience with the public and private sector. Desirable experience with public entities in the water sector. Work experience of at least 5 years in Latin America or the Caribbean. Advanced level of English.
National Water Sector Expert (N1)	Engineer, hydrologist or geologist or related, preferably with postgraduate studies in water resource management or related areas, with more than 10 years of experience in Belize in environmental management in the water sector. Work experience with public entities in the water sector. Experience in vulnerable watersheds, flood early warning systems, surface and groundwater monitoring, transboundary issues and water use rights. Experience in the implementation of national and/or local policies and action plans in the water sector. Demonstrable knowledge of the political framework on climate change in Belize, its NDC and Adaptation Plan. Experience in the systematization of processes and elaboration of highly complex reports that involve consultation of different types of actors. Group work experience and different participatory methodologies. It is expected that this expert will be based in Belize or with the availability to travel frequently and for long periods of time in Belize. Full command of English.
National communications and gender expert (N2)	Communication professional, anthropologist, sociologist or related with a minimum work experience of 10 years in the design of participatory workshops, design and moderation of focal discussion groups, and design of instruments and application of research techniques such as in-depth interviews and surveys. Experience in the water sector and climate change. Experience in the design and execution of social research, inclusion and mainstreaming of gender perspectives. Experience in the systematization of processes and preparation of reports. It is expected that this expert will be based in Belize or with the availability to travel frequently and for long periods of time in Belize. Full command of English.

6. Intended contribution to impact over time

As a result of this TA, the design of a monitoring system for groundwater and capacity building and knowledge transfer in groundwater monitoring is expected.

The designed monitoring system is expected to be implemented in a follow-up action and it should contribute in the long term to Belize's efforts to:

- Evaluate the progress of groundwater management interventions and quantify risk reduction, adaptive capacity, and impact on populations and economic activities.

- Establish a system to identify whether the implementation of any measure follows the planned paths, as well as the effectiveness of the measures and the possibilities for improvement.

- Establish effectiveness of the measures for groundwater management that can be implemented in the future.

This technical assistance also aims to involve relevant actors in an effort to define responsibilities and profit from synergies related to groundwater management, in this way strengthening the governance and planning of water resources and promoting the integration of climate resilience in development planning.

Likewise, it is expected that the financing strategy will serve to identify alternatives for the implementation and financial sustainability of the monitoring system.

7. Relevance to NDCs and other national priorities

This TA will contribute directly to Belize's Updated NDC (2021) , the Technology Needs Assessment on Adaptation (2017), Technology Needs Assessment on Mitigation (2016-2019), and the National Adaptation Strategy to Address Climate Change: Water Sector (2009).

Updated Nationally Determined Contribution (2021)
The TA will contribute to the target set by the NDC that aims to enhance the protection of water catchment (including groundwater resources) areas. Foreseen actions in Section 7. Adaptation: Water Resources include the design and implement groundwater hydrological monitoring network to inform drought monitoring activity, develop flood controls and drought monitoring (including both meteorological and hydrological drought) including an early warning system for flooding, 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, and 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 on Adaptation (2017)
The TNA on Adaptation in Chapter 4: Technology Prioritization for the Water Sector, Section 4.3 Overview of Existing Technologies in the Water Sector, page 98 stated that a "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." This TNA also identifies the lack of information regarding groundwater, especially in northern Belize as a barrier in the management of future water resources under climate change and increases the vulnerability of communities.

Technology Needs Assessment on Mitigation: Identification and Prioritization of Mitigation Technologies for Belize (taken from Belize Growth and Sustainable Development Strategy 2016-2019)
Among the actions indicated in the TNA on Mitigation for "Critical Success Factor 3: Sustained or Improved Health of Natural, Environmental, Historical and Cultural Assets", Action 4 involves the development of a "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.

8. Linkages to relevant parallel on-going activities:

The NHS already started a process for building an inventory of existing data on groundwater. The data is currently available but, spread among different agencies and institutions, and their various departments.

Data has been received from the Ministry of Agriculture and the Belize Water Services Ltd.; therefore, this is still a work in progress. Additionally, there is no complete geo-reference of wells.

The priority area the NHS would like to address is the New River watershed. This is in line with the prioritization of the areas in the NHS Strategic Plan 2021.

There are no comprehensive hydrogeological or hydrogeochemical studies of groundwaters in Belize. A limited study was done in the Master's Thesis "Groundwater Mapping in the Northern Districts of Belize" (Tennielle Williams). Another study was done by K. Payne and Ch. Pounder called "Groundwater Mapping and Water Quality Analysis in the Northern Districts of Belize", done in conjunction with the UNESCO Kingston Cluster Office. There are Journal articles on the area of interest in Mexico showing preferred flow path and other hydrogeological data; however, the research was not completed on the Belize side.

One investigation has been done on the Savannah Groundwater Province in the South.

9. Anticipated follow up activities after this technical assistance is completed:

Implementation of the groundwater monitoring system is foreseen as follow up activity as well as generating reports of groundwater monitoring to administrators and users of water.

10. Gender and co-benefits:

Imbedded in design of the activities:	The imbedded impact in the design of the activities is linked with the involvement of women in the working teams that will carry out this TA and tb the composition of the SWG and capacity building activities The activities include a study on gender considerations in the groundwater demand which will be useful for the definition of the monitoring system objectives and consequently design of the system
Gender and co-benefits intended as result of the activities:	Expected from this TA is the design of a groundwater quality monitoring system to be a tool for the planning and, thereafter, actual implementation of the monitoring system. In addition, the identification of risks for the supply of water for diverse groundwater users is expected to support the development of adaptation plans and activities.

	The design of the water monitoring system will support national objectives regarding access to clean water for communities and adaptation actions in water conservation. This will impact positively the life quality of women, in particular women involved in rural activities such as agriculture. 56% of the population in Belize lives in rural areas where the main source is groundwater.

11. Main in-country stakeholders in implementation of the technical assistance activities:

Using the table below, please list and describe the role of in-country stakeholders, participants and beneficiaries who will be involved in or directly consulted during implementation of the assistance.

In country stakeholder	Role in implementation of the technical assistance
National Climate Change Office, Ministry of Sustainable Development, Climate Change and Disaster Risk Management	**National Designated Entity and Request Applicant** 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

12. SDG Contributions:

*Instructions: Please complete the grey section below for **a maximum of three SDGs** that will be advanced through this TA. A complete list of SDGs and their targets is available here: https://sustainabledevelopment.un.org/partnership/register/.*

Goal	Sustainable Development Goal	Direct contribution from CTCN TA (1 sentence for top 1-3 SDGs)
1	End poverty in all its forms everywhere	-
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	-
3	Ensure healthy lives and promote well-being for all at all ages	-
4	Ensure inclusive and equitable quality education and promote life-long learning opportunities for all	-
5	Achieve gender equality and empower all women and girls	-
6	Ensure availability and sustainable management of water and sanitation for all	Through the design of a monitoring system for groundwater and the identification of risks for the supply of water for diverse groundwater users. 56% of the population in Belize lives in rural areas where the main source is groundwater.
7	Ensure access to affordable, reliable, sustainable, and modern energy for all (consider adding targets for 7)	-
	7.1 - By 2030, ensure universal access to affordable, reliable and modern energy services	-
	7.2 - By 2030, increase substantially the share of renewable energy in the global energy mix	-
	7.3 - By 2030, double the global rate of improvement in energy efficiency	-
	7.a - By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	-
	7.b - By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support	-
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	-
9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	-
10	Reduce inequality within and among countries	-
11	Make cities and human settlements inclusive, safe, resilient and sustainable	
12	Ensure sustainable consumption and production patterns	
13	Take urgent action to combat climate change and its impacts	*All TAs should indicate relevance to Goal 13 and at least one target below (13.1 to 13.b).*
	13.1 - Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	Identifying the vulnerabilities associated with the groundwater sources will allow to design adaptation actions related to the water sector.
	13.2 - Integrate climate change measures into national policies, strategies and planning	A monitoring system for groundwater will allow collecting data for decision making to identify risks, vulnerability assessment and to introduce measures into national policies and strategies in the water sector
	13.3 - Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	Capacity building in activities will contribute to the institutional capacity of the relevant entities in Belize on groundwater management
	13.a - Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible	
	13.b - Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities	
14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development	-

15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	-
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	-
17	Strengthen the means of implementation and revitalize the global partnership for sustainable development	-

13. Classification of technical assistance:

Please indicate primary type of technical assistance. Optional: If desired, indicate secondary type of technical assistance.

Please tick off the relevant boxes below	*Primary*	*Secondary*
☐ 1. Decision-making tools and/or information provision	x	☐
☐ 2. Sectoral roadmaps and strategies	☐	☐
☐ 3. Recommendations for law, policy and regulations	☐	☐
☐ 4. Financing facilitation	☐	☐
☐ 5. Private sector engagement and market creation	☐	☐
☐ 6. Research and development of technologies	☐	☐
☐ 7. Feasibility of technology options	☐	☐
☐ 8. Piloting and deployment of technologies in local conditions	☐	☐
☐ 9. Technology identification and prioritisation	☐	x

Please note that all CTCN technical assistance contributes to strengthening the capacity of in country actors.

14. Monitoring and Evaluation process

Upon contracting of the implementing partners to implement this Response Plan, the lead implementer will produce a monitoring and evaluation plan for the technical assistance. The monitoring and evaluation plan must include specific, measurable, achievable, relevant, and time-bound indicators that will be used to monitor and evaluate the timeliness and appropriateness of the implementation. The CTCN Technology Manager responsible for the technical assistance will monitor the timeliness and appropriateness of the Response Plan implementation. Upon completion of all activities and outputs, evaluation forms will be completed by the (i) NDE about overall satisfaction level with the technical assistance service provided; (ii) the Lead Implementer about the knowledge and learning gained through delivery of technical assistance; and (iii) the CTCN Director about timeliness and appropriateness of the delivery of the activities and outputs.