

Monitoring & Evaluation (M&E) Plan and Impact Statement Form

Objective of the M&E Plan and Impact Statement:

- The M&E Plan and Impact Statement must be designed based on the Technical Assistance Response Plan and must enable the Implementer to complete the Closure Report at the end of the assistance.

Basic Information	
Title of response plan	Groundwater monitoring for mapping aquifers in Belize as a tool for climate change adaptation planning
Technical assistance reference number	4700023827
Country/ countries	Belize
NDE focal point and organisation	Dr Lennox Gladden Chief Climate Change Officer and UNFCCC Focal Point Ministry of Sustainable Development, Climate Change and Disaster Risk Management
Sector(s) addressed	Water Early Warning and Environmental Assessment
Technologies supported	Water resource assessment Stakeholder consultations
Implementation period and total duration	September 2022 – August 2023 (12 months)
Total budget for implementation	GBP £187,177
Designer of the response plan	TBC – National Hydrology Service?
Implementer of response plan	HR Wallingford Ltd

(A) Outputs and Activities as described in the Response Plan	(B) Indicator	(C) Expected results	(D) Method and frequency for data collection	(F) Comments
Project-level impact	<i>Project impact: Improved monitoring of groundwater resources leads to the effective and sustainable management of groundwater, safeguarding the socio-economic benefits of an adequate supply of clean water.</i>			
	<p>Anticipated number of direct and indirect beneficiaries as a result of the TA</p> <p>% land area of Belize benefitting from improved groundwater monitoring</p> <p>Number of farmers / residents reliant on groundwater benefitting from more sustainably managed groundwater if monitoring plan implemented.</p>	<p>National Hydrology Service (direct beneficiary)</p> <p>Water users (domestic, business, agriculture, industry) in New River watershed (indirect beneficiaries as a result of improved monitoring leading to sustainable management of groundwater)</p> <p>Ministry of Natural Resources et al, Ministry of Agriculture et al Ministry of Sustainable Development, Climate Change and Disaster Risk Management (Climate Change Office, DoE and Forest Dept) Ministry of Rural Transformation et al. (indirect beneficiaries as a result of improved information on groundwater for sustainable management</p>	<p>These indicators could be measured by assessing the numbers of beneficiaries in the monitoring plan areas at the end of the project.</p> <p>For example, numbers of water service connections supplied by groundwater (BWS and rural supply services)</p> <p>For example number of registered farms in areas benefitting from improved monitoring</p>	<p>Assumes that system design and implementation plan are rolled out and become operational and sustainable following the completion of the TA. This implies the necessary financing and technical capacity are in place at the end of the TA to implement the monitoring system.</p>

Output 1: Development of work plan and related communication documents	Work plan developed, M&E plan developed, impact statement developed and project closure reports completed	The following reports complete and submitted to CTCN and Belize client D.1.1: Detailed implementation plan; D.1.2: Monitoring and evaluation plan; D.1.3: Impact Statement (initial and final version); D.1.4: Technical Assistance Closure Report.	Completed at project kick off and reviewed at project closure	
Output 2: Map Stakeholders and establish a stakeholder working group (SWG)	Total number of institutions identified Number of participants co-opted to the SWG a) number of men b) number of women Stakeholder Working Group in place and operational by month 2	Minimum of 9 institutions Minimum of 8 stakeholder working group members a) 5 b) Minimum of 3 Number of SWG interactions in providing expertise and oversight of the project	Reports and minutes submitted to NHS Belize and CTCN	Assumes SWG members have the time and interest in positively contributing Gender balance of SWG depends on gender balance of SWG organisations
Activity 2.1: Map Stakeholders	Total number of institutions identified	Report on stakeholder mapping with roles and responsibilities identified.	A documented report on stakeholders mapping / once	
Activity 2.2: Establish a stakeholder working group	Anticipated number of participants agreeing to join the SWG a) number of men b) number of women	Minimum of 8 stakeholder working group members a) 5 b) Minimum 3	Documented meeting minutes showing the selected SWG members	All selected members will participate in the process to the end of the TA
Activity 2.3: Conduct an inception meeting	Anticipated number of organisations engaged in the meeting Number of participants taking part in the meeting a) number of men b) number of women	Minimum of 9 institutions Minimum of 8 stakeholder working group members	Documented meeting minutes	List of institutions engaged will be provided as part of the stakeholder mapping activity

Output 3: Assess groundwater availability and demand based on the available technical information	Groundwater demand and availability assessed in Belize, based on desk study Information on aquifer characteristics of New River compiled and assessed	Reports submitted to CTCN and Belize client D 3.1 – 3.3: Assessment of groundwater demand and availability; D 3.4 Report on the hydrogeology of the New River watershed.	Reports submitted to CTCN and Belize client	The detail and accuracy of the assessment is dependent on the availability of sufficient information to assess demand and availability.
Activity 3.1: Information compilation	Information on groundwater demand, trends and issues compiled	Data register completed	included as part of D3.1-3.3 report submitted to CTCN and Belize client	
Activity 3.2: Baseline analysis	Analysis of groundwater demand and supply recent trends	Baseline analysis completed	included as part of D3.1-3.3 report submitted to CTCN and Belize client	
Activity 3.3: Analysis of the current and projected economic activities and the water demand on groundwater sources	Projection of future trends in groundwater demand and supply	Trends analysis completed	included as part of D3.1-3.3 report submitted to CTCN and Belize client	
Activity 3.4: Map the groundwater resources of Belize in the prioritized area of the New River watershed	Mapping of aquifers (based on existing borehole records, maps and hydrogeological information)	Mapping analysis completed	D 3.4 Report on the hydrogeology of the New River watershed submitted to CTCN and Belize client	The detail and accuracy of the assessment is dependent on the availability of sufficient information to assess demand and availability

Output 4: Design a fully integrated groundwater monitoring system that will enable Belize to manage groundwater resources in the two priority areas	Groundwater monitoring system design completed and approved by Belize client and CTCN	Reports submitted to CTCN and Belize client D 4.1 to D 4.3: Technical notes and minutes of meetings; D 4.4: Benchmarking report; D 4.5: Virtual workshop report. D 4.6 Monitoring system design report D 4.7 Workshop with SWG and final version of monitoring system design report	Reports submitted to CTCN and Belize client	The fitness for purpose of the system will rely on engagement from stakeholders and their information requirements being clearly articulated.
Activity 4.1: Defining the area to be monitored	Definition of monitoring area within New River Watershed	Monitoring area defined and agreed with Belize client	D 4.1 to D 4.3: Technical notes and minutes of meetings submitted to CTCN and Belize client	
Activity 4.2: Defining information needs	Information requirements defined	List of information needs disaggregated by stakeholder with examples of how this information will be used by each stakeholder	D 4.1 to D 4.3: Technical notes and minutes of meetings submitted to CTCN and Belize client	
Activity 4.3: Defining monitoring objectives considering different users and data needs including topics such as uses of the land and nature conservation	Monitoring objectives defined	Monitoring objectives (locations, variables, frequency of collection) defined and agreed with the Belize client	D 4.1 to D 4.3: Technical notes and minutes of meetings submitted to CTCN and Belize client	
Activity 4.4: Benchmark and select the most suitable groundwater monitoring technologies	Technology for monitoring recommended	Technology benchmarked and recommended technology selected and agreed with Belize client	D 4.4: Benchmarking report; submitted to CTCN and Belize client	

Activity 4.5: Virtual workshop to share similar experiences in the region and a meeting with the SWG to discuss the characteristics of the groundwater monitoring system	Virtual workshop held	Virtual workshop with X number of regional participants to share good practice in groundwater monitoring. Lessons fed back into system design and Output 5.	D 4.5: Virtual workshop report submitted to CTCN and Belize client	Assumes that appropriate regional participants are able to attend and share knowledge
Activity 4.6: Design a groundwater monitoring system	Groundwater system design	Groundwater system designed, based on area, information needs and technology benchmarking	D 4.6 Monitoring system design report submitted to CTCN and Belize client	
Activity 4.7: Organize a virtual meeting with the SWG and the NDE to present the groundwater monitoring system and the implementation plan	Virtual workshop held and system design approved.	Virtual workshop held and system design presented. Endorsement granted by SWG and NDE.	D 4.7 Workshop with SWG and final version of monitoring system design report submitted to CTCN and Belize client	
Output 5: Enabling factors for implementation: financing, institutional settings and capacity building	Implementation roadmap developed and capacity development carried out with stakeholders	Reports submitted to CTCN and Belize client D 5.1: Cost analysis and finance strategy; D 5.2 Concept note; D 5.3 Proposal on implementation plan including institutional setting; D 5.4: Implementation roadmap (which contains the above elements); D 5.5: Copies of the road maps and summary for the training. Project closure report on the training and recommended next steps.		Assumes strong engagement from stakeholders to contribute to and support the implementation roadmap.

Activity 5.1: Specification of required budgets for each monitoring objective	Budget and funding/finance analysis completed	Budget and funding/finance analysis completed and integrated into Implementation Roadmap report	D 5.1: Cost analysis and finance strategy submitted to CTCN and Belize client	
Activity 5.2: Finance strategy	Concept note prepared based on financing strategy	Concept note for climate financing prepared in draft form for completion and submission by NDE (finalisation and submission is outside this project scope)	D 5.2 Concept note submitted to CTCN and Belize client	
Activity 5.3: Institutional assessment	Institutional assessment undertaken	Institutional assessment completed and integrated into Implementation Roadmap report	D 5.3 Proposal on implementation plan including institutional setting submitted to CTCN and Belize client	
Activity 5.4: Feasibility analysis	Feasibility analysis for upscaling nationwide undertaken	Feasibility analysis completed and integrated into Implementation Roadmap report	D 5.4: Implementation roadmap (which contains the above elements) submitted to CTCN and Belize client	
Activity 5.5: Training with relevant entities in the sector	X number of stakeholders aware and understand the system design and implementation plan	Training workshop with X number of participants undertaken in Belize	D 5.5: Copies of the road maps and summary for the training. Project closure report on the training and recommended next steps submitted to CTCN and Belize client	Assumes participants are able to join the training, and institutionalise the training outputs into their roles.

Impact statement

Challenge

Belize is located in Central America and is exposed to climate change and variability events can affect the access to clean water due to

	<p>intensification of the hydrological cycle, saltwater intrusion into coastal aquifers, sea level rise and impact of hurricane seasons.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>
CTCN assistance	<p>The overall purpose is to 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. The project outcomes will increase climate resilience in Belize by designing a groundwater monitoring system to assess and control the impacts of groundwater abstraction and contaminant loads to Belize aquifers through monitoring aquifer response and quality trends. The main outputs include:</p> <ul style="list-style-type: none"> • A communications plan and detailed work plan; • Map stakeholders and establish a stakeholder working group; • An assessment of groundwater availability and demand; • Design of an integrated monitoring system that will enable Belize to manage groundwater resources in the priority area; • Establish enabling factors for implementation, including financial, institutional setting and capacity building.
Anticipated impact	<ul style="list-style-type: none"> • This project will provide a design for a groundwater monitoring system for the New River Watershed and an implementation plan for scaling this system up to national level. It will also develop capacity amongst national stakeholders to understand and act on the implementation plan. • Once in place the groundwater monitoring system will allow stakeholders to understand trends in groundwater quality and quantity, in the face of development pressures and climate change impacts. This in turn will underpin the sustainable use and effective management of groundwater resources. • The effective and sustainable management of groundwater resources will safeguard the socio-economic benefits of clean and

	<p>sufficient water resources for human health and economic activities which depend on water, such as agricultural livelihoods and tourism.</p>
<p>Anticipated co-benefits from the TA</p>	<p>This project will raise the profile of groundwater management amongst relevant stakeholders including government ministries and departments, and in turn the communities which they engage with.</p> <p>It also offers the opportunity to develop and share knowledge regionally on good practice in developing sustainable monitoring systems.</p>
<p>Gender aspects of the TA</p>	<p>Men and women’s roles and representation vary in productive and domestic life. Even within predominant Agriculture Sector in Northern Belize, gender roles determine participation, ownership and responsibilities. As part of the assessment of groundwater availability and demand, the project will use gender studies and interview relevant stakeholders to put forward a gender perspective on groundwater demand and risks facing women and vulnerable groups with respect to groundwater availability and access.</p> <p>Men and women are not homogenous groups in Belize. Belize's ethnic, cultural and socio-economic diversity manifests varied roles and responsibilities of men and women in society. However, the 2016 Country Gender Assessment¹ revealed that patriarchy is deeply embedded in key and influential social institutions and across ethnic groups. Patriarchal norms predominate in rural communities and where there are strong religious mores. This is the case in most communities along the New River Water Shed, where women principally have responsibility for unpaid work, small-scale farming activities on family farms, and domestic and reproductive activities. Therefore, reliable access to water for women as caregivers for dependents, and vulnerable populations is important to reduce the load of unpaid care and domestic work. The Project will ensure that differentiated needs of women and men as users, regulators and decision makers of water resources are captured through-out the outputs.</p> <p>Access to safe water, like gender equality are human rights. By upholding these rights, vulnerable groups, of which a larger percentage are women and girls, will benefit from opportunities that facilitate stronger and less biased decision-making. This project will propose, to the extent possible, a balanced representation of men and women in important decision-making spaces, like the Project’s Stakeholder Working Group, based on the recognition that there is differentiated gender use and needs for water.</p>
<p>Anticipated contribution to NDC</p>	<p>The Nationally Determined Contribution (2016) indicated water resource assessment (especially groundwater) as part of the main actions to be implemented to build resilience.</p>

¹ Huggins, T. (2016). Belize Country Gender Assessment 2016. Caribbean Development Bank.

The narrative story

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.

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

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.

Contribution to SDGs

The project outcomes respond directly to SDG 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 to the supply of water for diverse groundwater users, particularly those in rural areas where 56% of the population in Belize lives. The outcomes also respond to SDG 13 'Taking early action to combat climate change and its impacts' by identifying risks and vulnerabilities associated with groundwater sources, supporting the design of adaptation actions, informing national policies and strategies related to the water sector;

	and building institutional capacity of relevant entities in Belize on groundwater monitoring and management.
Reference to knowledge products	N/A