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 the National Designated Authorities (NDAs) for the Green Climate Fund (GCF) if targeting the GCF Readiness Programme.

Requesting country or countries:	Kingdom of Cambodia
Request title:	Application of the gravity-driven membrane (GDM) technology for supplying sustainable drinking water to rural communities in Cambodia
NDE	The General Secretariat of the National Council for Sustainable Development/ Ministry of Environment Dr. Hak Mao,Director of the Department of Climate Change Email: maohakccd.se@gmail.com Address: Morodok Techo Building (Lot 503) Tonle Bassac, Chamkarmorn, Phnom Penh, , Cambodia
Request Applicant:	The General Secretariat of the National Council for Sustainable Development/ Ministry of Environment Dr. Hak Mao,Director of the Department of Climate Change Email: maohakccd.se@gmail.com Address: Morodok Techo Building (Lot 503) Tonle Bassac, Chamkarmorn, Phnom Penh Phnom Penh, Cambodia

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):

This section should answer the question "what is the problem?" Please summarise the problem related to climate change and/or the negative impacts of climate change in the country that the request aims to address.

Cambodia has limited access to high water quality and hygiene. Although there has been an improvement in urban areas, most rural areas still have difficulties in water and sanitation access[1]. Sufficient supply of safe water (including drink water) is crucial for rural people and would enable them to adapt to climate change, particularly in the prolonged drought situation that have occurred in Cambodia.

Provision of safe drinking water has been prioritized continuously by the Government of Cambodia as one of measures for climate change adaptation. In 2006, Ministry of Environment (MoE) established the National Adaptation Programme of Action to Climate Change (NAPA), selecting projects for climate resilience in Cambodia. 'Safer water supply for rural communities' was a prioritized project to construct wells/ponds and provide locally made water filters to rural Cambodians. Moreover, through the Technology Needs Assessment (TNA) funded by the Global Environment Facility (GEF), the Government identified top 5 adaptation technologies in water sector in 2013. Among them, 4 technologies (① rainwater harvesting from rooftops, ② small reservoirs, small dams and micro-catchments, ③ wells for domestic water supply and ④ household water treatment and safe storage) were related to clean and safe (drinking) water supply at community and household levels in rural Cambodia. In preparing the project ideas for safe water supply to communities and households, provision of safe drinking water and sanitation to rural people was considered as a critical target.

In rural Cambodia, people can have drinking water either from groundwater by using tube wells or from surface water (e.g. rivers and shallow ponds)[2]. Rainfall which is collected in cement structures or containers and stored in a long period is also provided to rural communities[3]. However, such sources of drinking water have a various level of chemical concentration, and some of them hardly meet a standard for drinking water. Arsenic and iron contamination (groundwater) and increased concentration of pesticide residue in open ponds (surface water) exist in drinking water sources. Moreover, parasites and bacteria are generated in the unsafely stored drinking water sources, causing water-borne diseases especially to children.

Cambodia suffers from water shortage in dry season. Some rural Cambodians need to travel to access

[1] *Pink, R.M. (2016) Cambodia: A Rural Water Crisis. In: Water Rights in Southeast Asia and India. Palgrave Macmillan, New York. pp. 35-61.*

[2] *MoE (2013) Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation. Ministry of Environment, Kingdom of Cambodia.*

[3] https://thewaterproject.org/water-crisis/water-in-crisis-cambodia

water sources for households and irrigation which could have very poor quality. Due to reducing the risk of water shortage, rainwater harvesting from rooftops, as mentioned above, has been prioritised as an adaptation measure in Cambodia[4]. However, some harvested water needs to take further process (e.g. filtration and/or treatment) to be provided as safe drinking water to rural communities and households.

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.

Many Cambodians living in rural areas have been unable to access clean (drinking) water. Safe drinking water supply was one of the prioritized concerns in the National Adaptation Programme of Action to Climate Change (NAPA). Among 20 prioritized NAPA projects, 'Safer water supply for rural communities' was included in which wells/ponds were constructed in selected areas, and locally made water filters were provided by non-governmental organizations (NGOs).

Moreover, there was effort to apply 'point of use' treatment methods for providing drinking water to households in rural areas. Water purification technologies, based on bio-sand[5] and ceramic[6] filtration, were implemented in rural Cambodia. According to Ministry of Environment (MoE)[7], such methods could decrease faecal contamination and the level of some pathogens; however, they could not reduce heavy metal concentration or remove agricultural waste-related contamination in drinking water sources.

Under international support, for example, from World Bank[8] and Japan Water research Center (JWRC)[9], several projects on water supply and sanitation improvement are currently carried out in Cambodia. In these projects, different approaches, such as small-scale piped water supply systems (World Bank) and supply of piped water from centralized wastewater treatment plants (JWRC), are applied for safe (drinking) water supply to rural households of Cambodia.

Specific technology[10] 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

[4] *MoE (2013) Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation. Ministry of Environment, Kingdom of Cambodia.*
[5] https://www.wsp.org/sites/wsp/files/publications/WSP_biosand_cambodia.pdf
[6] https://www.ircwash.org/sites/default/files/Brown-2007-Use.pdf
[7] *MoE (2013) Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation. Ministry of Environment, Kingdom of Cambodia.*
[8] http://documents.worldbank.org/curated/en/942241554084076305/pdf/Cambodia-Water-Supply-and-Sanitation-Improvement-Project.pdf
[9] http://www.jwrc-net.or.jp/aswin/en/newtap/report/NewTap_IWP17.pdf
[10] *"**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)*

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).

Most developing countries, including Cambodia, have a limited capacity to construct a large-scaled and centralized water treatment system. Even though the system exists, the countries have difficulties in operating and maintaining it due to lack of water experts (human capacity). Different types of water treatment technologies have been taken into account to be installed not only to provide safe water to rural communities of Cambodia but also to enhance their capacity for climate resilience; however, either financial (e.g. a high initial installation cost) or technical (a difficulty in operating and maintaining technologies) barriers have been identified.

A gravity-driven membrane (GDM) technology is eco-friendly and requires extremely low energy consumption to supply safe drinking water at community or household levels. This technology applies gravity to produce purified drinking water without additional use of energy, and its installation and operation and maintenance (O&M) are relatively easier and less costly compared to other conventional membrane-based water treatment technologies. It has been reported that the GDM filtration can decrease the levels of suspended solids and particulate matters as well as remove water-borne bacteria and coliform substantively. The GDM technology can sufficiently purify raw/contaminated water under low pressure conditions and operate longer without cleaning or flushing[11]. Overall, application of this small-scaled, decentralized, energy-efficient water treatment technology could be an appropriate measure to supply sustainable drinking water to communities in rural Cambodia where drinking water scarcity are getting serious due to climate variation and drought.

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:

[11] *Pronk, W., Ding, A., Morgenroth, E., Derlon, N., Desmond, P., Burkhardt, M., Wu, B. & Fane, A. G. (2019) Gravity-Driven Membrane Filtration for Water and Wastewater Treatment: A Review. Water Research, 149, 553-565.*

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; and*
- *Anticipated products to be delivered by the technical assistance.*

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

Overall objective

An objective of the technical assistance request is to implement a low-cost, sustainable, locally suitable gravity-driven membrane (GDM) technology for safe drinking water supply to rural communities. This technical assistance could support to reduce a risk of drinking water scarcity in rural Cambodia caused by climate change and frequent drought condition.

Anticipated groups of activities to be performed by the technical assistance

- (Activity 1) Overall review of drinking water quality and scarcity in rural Cambodia (literature review);
- (Actvitiy 2) Site selection to install and test a GDM technology for drinking water supply at community levels;
- (Activity 3) Quality analysis of drinking water sources in the selected site(s) and design of GDM filtration to be applied;
- (Activity 4) Installation of the GDM technology in the selected site(s);
- (Activity 5) Capacity building workshop on sustainanle management of the GDM technology at community levels;
- (Activity 6) Monitoring and evaluation of drinking water quality provided from the GDM technology in the selected site(s);
- (Activity 7) Cost-benefit analysis of applying the GDM technology for drinking water supply at community levels in rural Cambodia; and

- (Activity 8) Assessment of dinking water consumption patterns and health survey in the selected site(s).

Anticipated products to be delivered by the technical assistance

- Report on the overall review of drinking water quality and scarcity in rural Cambodia;
- Installation and operation of the GDM technology for drinking water supply to rural communities in the selected site(s);
- Capacity building workshop for rural communities in the selected site(s);
- Report on monitoring and evaluation of drinking water quality provided from the GDM technology in the selected site(s);
- Report on cost-benefit analysis of applying the GDM technology for drinking water supply at community levels in rural Cambodia; and
- Report on assessment of dinking water consumption patterns and health survey in the selected site(s).

Expected timeframe:

Please indicate the expected duration period for the requested technical assistance. Please note CTCN technical assistance is limited to a maximum duration of 12 months.

The duration of technical assistance is expected to be 12 months.

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

Anticipated gender co-benefits from the technical assistance

Women commonly suffer from climate change and face higher risks and greater burdens within their society. Most households in rural Cambodia boil water as a way of generating drinking water[12], and women in households have the burden of drinking water generation and collection. In some rural areas, there is gender inequality with regards to travelling for water access in dry season. Safe drinking water supply to rural communities through the gravity-driven membrane (GDM) technology will make women spend more time to engage in other activities with reduced work time for making safe and clean drinking water.

[12] *MRD (2010) National Sanitation and Hygiene Knowledge, Attitudes, and Practices (KAP) Survey. Ministry of Rural Development, Kingdom of Cambodia.*

Anticipated other co-benefits from the technical assistance

The GDM technology requires very low energy supply. Therefore, its application for providing safe drinking water to communities in rural Cambodia will also contribute to energy saving and carbon emissions reduction at community levels.

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 (NDE)	- Support for coordination of the technical assistance and communication with stakeholders - Provision of overall feedback to the CTCN and the implementor during the implementation of the technical assistance
Request Applicant	- Support for coordination of the technical assistance and communication with stakeholders - Provision of feedback (practical or technical issues) to the CTCN and the implementor during the implementation of the technical assistance
Ministry of Environment (MoE)	Consultation about the adaptation measures for sustainable drinking water supply in rural Cambodia and site selection of GDM technology installation
Ministry of Health (MoH)	Consultation about the quality of drinking water sources in rural Cambodia and site selection of GDM technology installation
Ministry of Water Resources and Meteorology (MoWRAM)	Consultation about water sources and rainfall situations in rural Cambodia and site selection of GDM technology installation
Department of Rural Water Supply (DRWS), Ministry of Rural Development (MRD)	Consultation about the drinking water supply in rural Cambodia and site selection of GDM technology installation
Provincial Department of Rural Development (PDRD)	Consultation about the drinking water supply in rural Cambodia (after site selection of GDM technology installation)
Commune Councils (CC)	Consultation about the drinking water supply in rural Cambodia (after site selection of GDM technology installation)

Alignment with national priorities (up to 2,000 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.

Reference document (please include date of document)	**Extract** (please include chapter, page number, etc.).
Nationally Determined Contribution (NDC) (2017)	*Direct alignment and contribution to NDC implementation is required for all CTCN technical assistances. Please include a direct reference to the INDC/NDC document (chapter, page number, etc.).*

	"Promoting and improving the adaptive capacity of communities, especially through community-based adaptation actions, and restoring the natural ecology system to respond to climate change" (Session 2 Adaptation – 2.2 Priority Actions, p.4)
Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation (2013)	"Household water treatment and safe storage" (Chapter 4 Technology Prioritisation for the Water Sector - 4.3 Results of Technology Prioritisation, p.22)
Cambodia Climate Change Strategic Plan 2014 – 2023 (2013)	"Promote community-based adaptation approaches and strengthen partnerships between development partners, civil society, the private sector and the Government" "Introduce technologies in water work development and rehabilitation in response to the negative impacts of climate change" (Chapter 5 Strategic Framework - 5.3 Strategic Objectives and Strategies - Strategic Objective 2: Reduce Sectoral, Regional, Gender Vulnerability and Health Risks to Climate Change Impacts, p.14-15)
National Adaptation Programme of Action to Climate Change (NAPA) (2006)	"Safer Water Supply for Rural Communities" (V. List of High Priority Activities, p.12; Annex 2 Proposed High Priority NAPA Activities, p.57-58)

Development of the request (up to 2,000 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 request has been developed based on meetings and consultations with line ministries and associated stakeholders working in the areas of drinking water supply in rural Cambodia. Safe drinking water supply to rural Cambodians has been included as an objective of the plans and associated strategies for climate change response. Different types of methods for drinking water supply at community levels have been suggested and implemented in rural Cambodia. Findings from previous and ongoing cases for drinking water supply to rural Cambodians have been considered in developing 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.*

1. Government plan & strategy for climate change response

- Nationally Determined Contribution (NDC) (2017)
  https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Cambodia%20First/Cambodia's%20INDC%20to%20the%20UNFCCC.pdf
- MoE (2013) Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation. Ministry of Environment, Kingdom of Cambodia.
  https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TNR_CRE/e9067c6e3b97459989b2196f12155ad5/add86d65dbba444ba28fee2a3882b21b.pdf
- National Climate Change Committee (2013) Cambodia Climate Change Strategic Plan 2014 – 2023. National Climate Change Committee, Kingdom of Cambodia.
  https://www.cambodiaip.gov.kh/DocResources/ab9455cf-9eea-4adc-ae93-95d149c6d78c_007729c5-60a9-47f0-83ac-7f70420b9a34-en.pdf
- MoE (2006) National Adaptation Programme of Action to Climate Change (NAPA). Ministry of Environment, Kingdom of Cambodia.
  https://unfccc.int/resource/docs/napa/khm01.pdf

2. Government report

- MRD (2010) National Sanitation and Hygiene Knowledge, Attitudes, and Practices (KAP) Survey. Ministry of Rural Development, Kingdom of Cambodia.
  https://camnut.weebly.com/uploads/2/0/3/8/20389289/2010_national_sanitation_and_hygiene_knowledge_attitudes_and_practices_kap_survey_eng_2010.pdf

3. Book & research article

- Pronk, W., Ding, A., Morgenroth, E., Derlon, N., Desmond, P., Burkhardt, M., Wu, B. & Fane, A. G. (2019) Gravity-Driven Membrane Filtration for Water and Wastewater Treatment: A Review. Water Research, 149, 553-565.
- Pink, R.M. (2016) Cambodia: A Rural Water Crisis. In: Water Rights in Southeast Asia and India. Palgrave Macmillan, New York. pp. 35-61.

4. Webpage

https://thewaterproject.org/water-crisis/water-in-crisis-cambodia

https://www.wsp.org/sites/wsp/files/publications/WSP_biosand_cambodia.pdf

https://www.ircwash.org/sites/default/files/Brown-2007-Use.pdf

http://documents.worldbank.org/curated/en/942241554084076305/pdf/Cambodia-Water-Supply-and-Sanitation-Improvement-Project.pdf

http://www.jwrc-net.or.jp/aswin/en/newtap/report/NewTap_IWP17.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[13].

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.

☐ 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.

Signature:

NDE name:	Dr. Hak Mao
Date:	12 June 2020
Signature:	

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

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.