CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

Technical Assistance Response Plan – Terms of Reference

Country	**Republic of Mozambique**
Request ID#	
Title	**Enhance resilience to floods by introducing technology for flood risk mapping and simulation to formulate relevant policies and countermeasures in the most flood-affected areas**
NDE	Mr. Antonio Jorge Raul Uaissone Head, Department of Technology and Innovation Ministry of Higher Education, Science and Technology Emails: tonyraul13@hotmail.com Address: Maputo, Av. 770 Patrice Lumumba, Mozambique
Proponent	Mr. Aristides Armando Provincial Delegate The National Institute for Disasters Management, Sofala Province aristides.armando@gmail.com Address: Airport Area, Regulo Luís Entrance, Air Base Enclosure.

Summary of the CTCN technical assistance

In Mozambique, more than 48% of population is vulnerable to drought and flooding[1]. It is situated at the path of tropical cyclones that across the country from north to south. In recent years, the country has suffered extreme flooding caused by tropical cyclones and significant economic damage. In fact, tropical cyclones expose 2 million people per year on average to high disaster risk, and 200,000 people affected by floods each year, on average.[2] Climate change is expected to increase disaster risk such as cyclone damage and widespread flooding through rising temperatures and changing weather patterns. Mozambique is frequently ravaged by cyclones, floods or drought, and the cyclones and floods of March 2019 were the most devastating in recent history in terms of its human and physical impact as well as its geographic extent. An estimated 3,000 sq. km of land and 715,378 hectares of cultivated land were flooded by cyclone IDAI. 400,000 had been displaced, of which 160,927 were sheltering in 164 temporary accommodation centers across the four provinces.[3] Following the cyclone IDAI, the cyclone Eloise in January 2021 caused severe flooding in Beira and surrounding districts.[4] These severe tropical cyclones hit the country more often before. As a collective action for climate adaptation, countermeasure for mitigating flood risk is one of the most fundamental issue in Mozambique.

This technical assistance (TA) proposes to introduce a web-based flood simulation software. The software is intended for use by policymakers to aid in identifying areas at risk of flooding, thus allowing them to formulate necessary policy countermeasures for disaster risk reduction (DRR). The TA will not only introduce the simulation technology but will also implement capacity training for officials to ensure that the technology is operationalized to be a key reference for policymaking.

Agreement:

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

[1] USAID. (2021). DISASTER RESPONSE
[2] World Bank. (2019). Disaster Risk Profile Mozambique
[3] Post- Cyclone Idai Cabinet for Reconstruction. (2019) Mozambique Cyclone Idai, Post Disaster Needs Assessment (PDNA)
[4] IFRC. (2022) Mozambique: 2021-2022 floods and cyclones | IFRC

CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

Technical Assistance Response Plan - Terms of Reference

National Designated Entity to the UNFCCC Technology Mechanism
Mr. Antonio Jorge Raul Uaissone
Head, Department of Technology and Innovation
Ministry of Higher Education, Science and Technology

Date: 20/12/2022
Signature:

Proponent (signature of the Proponent is optional)
Name: Aristides Armando
Title: Provincial Delegate
The National Institute For Disasters Management, Sofala Province

Date: dd/mm/yyyy
Signature:

UNFCCC Climate Technology Centre and Network (CTCN)

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

1. Background and context

Mozambique is located at the tropical and subtropical region and more than 48% of population is vulnerable to drought and flooding[5]. During the last 35 years there were 75 declared disasters in Mozambique consisting of 13 drought events, 25 floods, 14 tropical cyclones.[6] Mozambique's agricultural sector accounts for 30% of GDP, however, the harvest is vulnerable to natural disasters. Thus, the food insecurity could be caused by floods and droughts issues. In fact, tropical cyclones expose 2 million people per year on average to high disaster risk, and 200,000 people affected by floods each year, on average.[7] Climate change is expected to increase disaster risk such as cyclone damage and widespread flooding through rising temperatures and changing weather patterns. As a collective action for climate adaptation, countermeasure for mitigating flood risk is one of the most fundamental issue in Mozambique.

Although Mozambique has made efforts to develop disaster management capacity in recent years, the country still faces many challenges, particularly developing climate adaptation strategy against natural disasters such as flood risk reduction. For the adaptation of flood risk, based on the degree of hazard, exposure, risk, and vulnerability to flooding, Mozambique government should develop countermeasure strategy in their policy, however, there needs effective technical tool to analyse them and elaborate hazard maps in the flood affected areas. Developing hazard maps and updating them based on the past data for the beneficial disaster risk management is crucial for strengthening capacity for the Disaster Risk Reduction. Thus, the lack of the developing tool for flood hazard map and its capacity building is one of the most critical issues in Mozambique.

Given the increasing risk of flooding, this TA proposes to bolster existing mechanisms by introducing an intuitive, web-based flood simulation software. The software is intended for use by local disaster risk management policymakers to aid them in identifying areas at risk of flooding, thus allowing them to formulate necessary policy/infrastructure countermeasures for DRR. The proposed intervention differs from existing projects in that the target users would be policymakers who are not necessarily experts in river systems or civil engineering. Therefore, the TA will not only introduce the simulation technology but will also implement capacity training for officials to ensure that the technology is operationalized to be a key reference for DRR policymaking.

2. Problem statement

The key issues this TA aims to address are as follows:

- **Mozambique is the third most vulnerable country in Africa to extreme weather and climate events. Over the past 40 years, about 20 million people have been affected by natural disasters such as floods and droughts, cyclones.**
- **Flood risks are also expected to increase over the years because of climate change and ensuing shifts in weather patterns (rate of harsh tropical cyclones and changing precipitation patterns).**
- **Flood risks left unaddressed would entail serious socioeconomic consequences, such as loss of human life, risks to public health, and damage to physical properties as well as serious economic damage on agricultural sector which is fundamental industry in Mozambique.**

Implementation of technology to identify risk prone areas at local level and to simulate the impact of flooding would further enhance the government's DRR development. This TA aims to demonstrate the efficacy of a web-based flood simulation software for forecasting flood risks and formulating relevant policies. It includes a training component to ensure that officials are familiar with the software's operation, as well as creation of a roadmap outlining possible ways to expanding the software's uptake.

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.)

Objective: Strengthening resilience to floods through the introduction a web-based flood hazard mapping and simulation software in the the most flood-affected areas

Outcome:

- [Outcome 1] Capacity among key stakeholders including concerned officials is developed through training on DRR planning using a flooding risk simulation
- [Outcome 2] Resilience against climate change induced flooding in pilot sites is enhanced by integrating flood risk analysis and DRR measure planning

	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Mandatory Output 1: Develop implementation planning and communication documents												
Activity 1: *All implementers must undertake the following activities at the beginning and at the end of the CTCN technical assistance.* 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; 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. iii) A two-page CTCN Impact Description formulated in the beginning of the technical assistance and update/revised once the technical assistance is fully delivered. iv) A Closure and Data Collection report completed at the end of the technical assistance												
Deliverable 1: i) Detailed work plan ii) Monitoring and evaluation plan iii) CTCN Impact Description iv) Closure and Data Collection report												

Output 2: Disseminate the capability and usability of a flooding risk simulation software as a web service	
Activity 2.1: *Selecting web-based mapping and simulation software* In this activity, the flood mapping and simulation to be used for the demonstration will be selected. The software should be web-based, meaning that it can be operated from a web browser rather than through a dedicated software, and low cost. The software will have Geographic Information System (GIS) features to identify areas with high flood risk plus additional features that enable the analysis of expected damage as well as the impact of countermeasures, such as embankment.	
Activity 2.2: *Site selection for technology demonstration and capacity building* A few sites will be selected to pilot the technology. Site selection is crucial for the capacity building exercises planned for later activities. The sites will be selected based on a set of agreed criteria, such as 1.) exposure to flood risks, 2.) the magnitude of socioeconomic impact, including risk to the population, 3.) existence of countermeasures planned or in place, 4.) expressed need from officials at the pilot site, and others. The area of Buzi river basin, Pungue river basin, Savane river basin (Buzi, Nhamatanda and Beira) in Sofala province are considered as first prioritized candidates for the pilot sites as of this TA proposed. Limpopo river basin in Gaza province (Xai-Xai and Chokwe) could be a second prioritized candidate for another possible pilot area, however, the involvement of Gaza province will be mainly in a capacity building activity.	
Activity 2.3 *Digital Elevation Model (DEM) data selection* Based on software parameters and sites selected, Digital Elevation Model (DEM) data will be selected and purchased for the analysis and simulation. The data selection is necessary not only for defining the area covered but also how detailed the analysis would be. A more detailed map would better replicate topographical features and urban landscapes, thus allowing for a much more accurate flood simulation by showing how different landscapes, buildings, and infrastructure, including subterranean infrastructure, could affect the course a flood would take. The resulting data would better inform the type of countermeasures that would be effective for flood risk reduction as well as how the water would behave depending on where the countermeasures are placed. The implementor needs to calculate the balance of the data cost and benefit in procuring the DEM data.	

Deliverable 2:												
i) Web-based software selection report		X										
ii) Pilot site and DEM data selection report			X									
iii) Report on the inception meeting, including meeting minutes, list of participants			X									
Output 3: Integrate flood risk analysis of multiple piloting locations and flood risk reduction measures into the policy cycle in the Sofala province to increase resilience against climate change induced flooding												
Activity 3.1: *Stocktaking of current flood hazard map and existing countermeasure* The first step towards the output is to take stock of existing flood hazard maps and countermeasures in place, if any, along these points. Review of existing hazard maps and site survey will be done to investigate which areas for which extensive studies have not been performed and where additional hazard data would be beneficial. Considerations on countermeasures in place would include not only whether such mechanisms are in place but also what type of countermeasures have been deployed. This information would assist in the simulation component of the following activity and inform what means of countermeasures would be effective in flood prevention.												
Activity 3.2: *Conduct flood risk analysis and simulation at a few pilot sites* Flood risks will be analysed for a few pilot sites selected to create updated hazard maps. Once hazard areas have been mapped out, a simulation will be conducted using the hazard data obtained. This step would not only consider the effect of topographical features on flooding patterns but also the impact of countermeasures or other infrastructure that would direct the flow of water differently.												
Activity 3.3: *Draft flood risks analysis report* The findings from the analysis and simulation will be compiled into a report. The report will firstly describe simulation results, detailing the forecasted pathway of floods and areas at high risk of floods. Additionally, the report will also identify areas that would be particularly vulnerable as indicated by the output of the simulation. The degree of the impact of flooding will be assessed under different scenarios, accounting for rainfall, population growth and urban development, as well as countermeasures already in place or planned.												
Deliverable 3:												
i) Progress report					X							
ii) Flood risk analysis report						X						
Output 4: Build technology capacity of concerned officials through training for local policy implementers in Sofala and Gaza provinces												
Activity 4.1: *Conduct capacity building exercises for provincial officials of the pilot sites*												

Officials from the Sofala Province and Gaza Province (Limpopo river) will be invited to take part in capacity building exercises to learn the operations of the software, from understanding GIS mapping to conducting simulation input and performing analysis. The training contents also include initial cost-benefit analysis on the flood countermeasures and effective approaches on policy consideration of the flood risk simulation. The training will be held at National Institute for Disasters Management (Sofala Province) and another municipality determined through the discussion with relevant public entities, such as Maputo and Xai-Xai.													
Activity 4.2: *Reflect feedback from the training for the provincial officials to the training for local officials.* The participants of Activity 4.1 will be requested to provide feedback of the training session. The feedback will then be reviewed and incorporated into lessons learned and challenges identified. The feedback is crucial to understanding the local officials' perception of the software and its operation, thus informing the design of the following training for officials in local.													
Activity 4.3: *Summarize the training report and address feedback from provinces/local* A training report will be compiled at the conclusion of the training sessions, incorporating findings from the training sessions, including feedback from the two sessions, impressions on software use and efficacy in disaster prevention planning, and difficulties and challenges identified.													
Deliverables 4:													
i) Capacity building exercise materials, including presentation slides and minutes										X			
ii) Trainee survey										X			
iii) Training report										X			
Output 5: Understand and analyse gaps in developing a larger climate change adaptation project leveraging GCF													
Activity 5.1: *Identification of good practices, lessons learned, and bottlenecks to the broader uptake of the software* This activity concerns the identification of good practices that may be applied for future, relevant projects as well as challenges that were encountered during implementation. These challenges may include technical difficulties on software operation, challenges to implementing simulations, or difficulties in arranging for capacity building. Another challenge that will be discussed concerns difficulties that may be encountered when upscaling the software for wider uptake among local governments and relevant agencies. The challenges will be described and actions to mitigate them will also be discussed. The findings from the activity will be consolidated into an evaluation report, which will then be utilized to develop the roadmap described below.													

Activity 5.2: *Roadmap development for further uptake of the technology* Based on the demonstration of the technology and the capacity building exercises, a roadmap to the further uptake of the technology and its wider application to flood prevention will be developed under this activity. The goal of the roadmap is to outline a pathway to identifying adaptation projects relating to flood disaster risk reduction that could be submitted to the Green Climate Fund for further development. The roadmap will also consider the types of countermeasures that may be applicable, such as nature-based solutions to disaster mitigation and prevention. Therefore, the roadmap will describe factors that will need to be considered in developing further projects for the uptake of the software and in developing appropriate countermeasures to mitigate the risks from floods and related hazards. A crucial factor that it will address relates to cost estimation, including considerations for software and map purchasing costs as well as cost-benefit analysis as determined from the outcome of the pilot.												
Deliverables 5:												
i) Project implementation evaluation report											X	
ii) Roadmap report, including concept for potential DRR projects												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 (USD)	**Maximum (USD)**
Output 1: *Develop implementation planning and communication documents*	I1: 2 days N2: 2 days	N/A	4,000		**5,000**	**5,500**
Output 2: *Disseminate the capability and usability of a flooding risk simulation software as a web service*	I1: 10 days I2: 10 days I3: 10 days I4: 2 days N1: 5 days N2: 7 days G1: 2 days			USD 60,000 (Purchase cost for DEM data in three pilot sites)	**77,000**	**80,000**
Output 3: *Integrate flood risk analysis of multiple piloting locations and flood risk*	I1: 21 days I2: 30 days I3: 30 days I4: 6 days N1: 16 days				**46,000**	**52,250**

reduction measures into the policy cycle in the Sofala Province to increase resilience against climate change induced flooding	N2: 9 days G1: 5 days					
Output 4: *Build technology capacity through training for policy implementors in central/local*	I1: 5 days I2: 5 days I3: 5 days I4: 2 days N1: 3 days N2: 3 days G1: 2 days				**15000**	**30000**
Output 5: *Understand and analyse gaps in developing a larger climate change adaptation project leveraging GCF*	I1: 5 days I2: 5 days I3: 5 days I4: 2 days N1: 3 days N2: 3 days G1: 2 days				**9,500**	**11,000**
Estimated range of costing for the entire Response Plan					**152,500**	**178,750**

5. Profile and experience of experts

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 and International expert in climate adaptation/finance (I1)	• Master's degree or above (or equivalent experience) in climate change adaptation, climate finance, climate technology, or an affiliated major. • International experience in leading and managing a project and a team of experts from different cultural backgrounds and fields of expertise. • At least 7 years of international experience of working with various countries' national and local governments, local stakeholders, and authorities on defining and developing climate adaptation strategies. • At least 10 project references demonstrating experience in the identification of adaptation technologies and development of climate finance scheme in developing countries. • Experience in climate change adaptation work with a focus on technology transfer, project management, high-level negotiations. • Experience in capacity building, organizing workshops and capacity building. • Excellent written and communication skills in English are compulsory.
International expert in hydrological disasters (I2)	• Master's degree or above (or equivalent experience) in flood and coastal risk management, water environment, meteorology, urban engineering, or an affiliated major. • At least 7 years of experience in disaster preparedness and preparation, particularly for floods, or related fields in disaster risk reduction, including but not limited to urban engineering, infrastructure design, and disaster analysis. • At least 5 project references demonstrating experience in flood risk management, particularly in the identification of hazard area and disaster forecasting. • Previous experience of working with hydrological infrastructure or flood prevention in Mozambique, especially in Sofala province, will be advantageous. • Familiarity with GIS and other mapping systems is a plus. • Excellent written and communication skills in English are required.
International expert in flood mapping and simulation (I3)	• Master's degree or above (or equivalent experience) in flood mapping and simulation technology and data analysis or an affiliated major. • At least 5 years of experience in flood mapping and simulation technology and data analysis or related field is required. • Previous experience working on projects that utilize flood risk simulation software as a web service will be valued. • Previous experience of working on flood issues in Mozambique, especially in Sofala province, will be valued.

	• Excellent written and communication skills in English are required.
International expert in capacity building (I4)	• Bachelor's degree or above (or equivalent experience) in public administration, capacity building, or an affiliated major. • A minimum of 5 years of relevant experience in capacity building for public officials and administrators is required. • Previous experience in working with central and local governments in Mozambique, especially in Sofala province, is an asset. • Excellent written and communication skills in English are required.
Local expert in hydrological disasters (N1)	• Master's degree or above (or equivalent experience) in flood and coastal risk management, water environment, meteorology, urban engineering, or an affiliated major. • A minimum of 7 years working in the field of flood and disaster management in Mozambique, especially in Sofala province, or related fields. • At least 5 projects for reference that demonstrate the expert's knowledge disaster risk reduction. • Experience in providing disaster consultancy to public agencies would be advantageous. • Familiarity with GIS and other mapping systems is a plus. • The local expert is expected to be based in the Mozambique for the duration of the TA. • Excellent written and communication skills in English are required. Fluency in Portuguese is an advantage.
National coordinator (N2)	• Bachelor's degree or above (or equivalent experience) in policy, communication or an affiliated major. • A minimum of 5 years of relevant experience in institutional coordination in the Mozambique • Previous experience in working with central and local government in the Mozambique is an asset. • Previous experience in coordination of workshops and capacity building trainings is highly valued. • Excellent written and communication skills in English are required. Fluency in Portuguese is also a must. It is expected that the national coordinator will be based in the Mozambique for the duration of the TA.
Gender Expert (international/national) (G1)	• Bachelor's degree or above (or equivalent experience) in gender studies or other discipline with focus on the field of gender issues in a developing country context. • At least 5 years of experience in gender mainstreaming in climate change adaptation. • Preference given for experience in gender studies in the Mozambique and/or African countries. • Experience in stakeholder engagement processes is valued. • Excellent written and communication skills in English are required. • Excellent written and communication skills in English are required. For the local Gender Expert, fluency in Portuguese is also an advantage.

6. Intended contribution to impact over time

The aim of the TA is to pilot technology that would enable the objective analysis of flood risks and patterns to enhance DRR policies, strengthen communal preparedness and establish effective countermeasures. The flood risk analysis needs to become much more pertinent because of the increased risks imposed by climate change. The simulation software would be an adaptation software for just such purpose, and its successful implementation would allow for the formulation of informed, data driven DRR policies and countermeasures. The technology would also raise expertise among officials when planning for flood risk reduction by enabling the systematic collection and storage of data. Expertise building will be addressed in part through the TA, which includes a capacity building component.

The development of robust policies would consequently help to save lives and minimise damage to property. In Mozambique, 200,000 people per year on average affected by floods. Enhanced method to collect data on areas prone to flooding would help to reduce the number of people who are affected by flood events.

7. Relevance to NDCs and other national priorities

Mozambique's **Nationally Determined Contributions** (NDC) updated in 2021 prioritise both adaptation and mitigation measures, and defined their projects and policies from 2020 to 2025. The NDC emphasises the country is the most vulnerable to cyclones, followed by floods, and it is affected by a tropical cyclones or flood event every two years which account for 77% of the total disaster events in 1980-2019[3]. It also notes that the importance of the developing strategic actions to build climate resilience. NDC prioritises capacity development for disaster risk management at local level by enhancing preparedness such as early warning system to raise climate risk response capacity. It also emphasises the necessity of promoting resilience for floods both in rural and urban areas because floods could negatively affect the agriculture which is the mainstay of the Mozambican economy.

Mozambique also issued **National Climate Change Adaptation and Mitigation Strategy for 2013-2025** and defines eight strategic areas: Reducing Climate risk; water resources; agriculture, fisheries, and food security and nutrition; social protection; health: biodiversity: forests; infrastructure. For the reduction of climate change risk, action plans aimed at increasing the resilience of local communities are elaborated by 128 provinces as well as national action plan[4].

The Government of Mozambique has increased climate resilience by developing other disaster management policy as the **National DRR Master Plan (2017-2030)**, to be aligned with the main instruments that guide the actions that contribute to Disaster Risk Reduction at a global and local scale[5]. **Disaster Risk Management and Reduction Law 10/2020** is a basis of DRR management in Mozambique and establishes the legal regime for disaster risk management and reduction, comprising the following sectors: risk reduction, disaster management, sustainable recovery for the construction of human, infrastructural and ecosystem resilience, as well as the adaptation to climate change[6].

[3] Ministry of Land and Environment, Republic of Mozambique. (2021). Nationally Determined Contribution
[4] UN. (2019). National Adaptation Plans in focus
[5] Government of Mozambique. (2017). Master plan for disaster risk reduction 2017-2030
[6] UN. (2020). Law No. 10/2020 approving the Disaster Risk Management Act.

8. Linkages to relevant parallel on-going activities:

Mozambique has several ongoing projects that relate to disaster risk management. The project "Strengthening Urban Resilience and Disaster Preparedness" is currently implemented by World Bank, to support the Government of Mozambique to better manage disaster risk and enhance climate resilience by providing technical support in two critical areas (1) resilient infrastructure, including housing; and (2) emergency preparedness and response at national and local levels[7]. Japan International Cooperation Agency (JICA) is implementing "Project on Strengthening Resilience in Cyclone IDAI-Affected Areas" from 2019 to 2022. The objective of this project is Reconstruction and recovery from Cyclone Idai will be promoted, which contributes to build disaster resilient city through implementation of the Beira Municipality Recovery and Resilience Plan. The main activities for the project are (1) Disaster risk assessment and hazard maps; and (2) Action plans in the target areas of BMRRP with reference to the hazard maps[8].

As a domestic initiative, the main governmental body responsible for DRR operations in the country is the National Institute for Disasters Management INGD and each INGD provincial office implementing their activities to raise the capacity for climate adaptation.

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

The TA aims to introduce flood mapping and simulation technology via a web-based software, to assess the technology's efficacy in identifying risk prone areas and appropriate countermeasures. The assistance would entail capacity building exercises to ensure that the local officials onboard the project have the knowledge and expertise needed to effectively utilize the technology for DRR policy formulation. Should the project be successful, this would not only provide the impetus to encourage the uptake of the technology elsewhere in the country but also provide for officials with the necessary knowledge to educate other policymakers and stakeholders. In this respect, the TA would provide the foundation from which stakeholder such as staff in local governments can build their expertise and skills of operating the technology. In addition, ways to apply for GCF will also be explored during the TA. A roadmap will be developed towards the end of the project based on the findings from the pilot, such as the adaptative capacities that must be developed to enhance resilience and how funds from the GCF will be used to achieve this. This roadmap will also consider the challenges to the wider uptake of the technology across the provinces and country, including good practices from the pilot, lessons learned, and potential barriers to the technology's promulgation.

10. Gender and co-benefits:

Imbedded in design of the activities:	The TA will ensure the equal representation of women and men as well as participation of gender focal points and associations that promote gender equality and empowerment of women and other vulnerable groups throughout the process. Furthermore, a gender-sensitive training curriculum and materials will be developed to encourage participation of women and other vulnerable groups. There will also be emphasis on gender balance on the actual training sessions and meetings. In this regard, a gender expert will

[7] World Bank. (2021). Strengthening Urban Resilience and Disaster Preparedness in Mozambique
[8] JICA. (2019). Project on Strengthening Resilience in Cyclone IDAI-Affected Areas

	be consulted throughout the implementation of the TA to mainstream gender in each activity.
Gender and co-benefits intended as result of the activities:	The intuitive, web-based flood simulation software and the related activities under this TA will enable female local officials to design DRR countermeasures by allowing them, who are not necessarily experts in river systems or civil engineering, to access to flood risk data. This will create windows in DRR where has been traditionally and generally dominated by male ideas and experiences.[9] The case studies from the Philippines, Indonesia and Samoa founds that vulnerability to natural disaster is gendered and contextual.[10] Therefore it is crucial that women take part in designing DRR measures fitting in each context to avoid a "one-size-fits-all" approach that may be insufficient and inappropriate in the areas of gender and DRR. Considering this aspect, this TA will involve female policy makers and/or administrative officers in planning and implementing DRR measures to ensure addressing climate-induced vulnerability. Flooding impacts men and women differently, and analysis pointed out that mortality among women is usually higher compared to men in the events of flooding in less developed countries, primarily due to drowning.[11] This cause of death may have a relation with gender-based social norms. For example, a study from Philippines suggests that the cultural norm of "modesty" significantly hampers the swimming capacity of women and girls, which also has transgenerational effect.[12] Furthermore, a study on monsoon-induced floods in Bangladesh attributes disproportionate affects for women and girls to limited social capital held by women, including limited information available for early warning as well as low awareness of hazard maps.[13] In the socio-economic aspect, the Pilipino women in rural and/or less-developed areas could face economic hardships in post-flood period too. This stems from the trend that women or female-headed households usually possess, own, or manage fewer properties (especially land) to sell to cover financial damages for agricultural harvests caused by floods.[14] On the other hand, women are also already pivotal to emergency preparedness. Studies have shown that women are more likely to be better prepared for disasters when they are provided with necessary information. They also play a crucial role in supporting communities when building resilience, as they are often familiar with local knowledge and needs and tend

[9] We Effect. Gender Transformative Disaster Risk Reduction
[10] We Effect. Gender Transformative Disaster Risk Reduction
[11] Alvina Erman, Sophie Anne De Vries Robbé, Stephan Fabian Thies, Kayenat Kabir, Mirai Maruo (2021). Gender Dimensions of Disaster Risk and Resilience. The World Bank and the Global Facility for Disaster Reduction and Recovery (GFDRR).
[12] Hunter LM, Castro J, Kleiber D, Hutchens K. (2016). Swimming and Gendered Vulnerabilities: Evidence from the Northern and Central Philippines. Soc Nat Resour. 2016;29(3):380-385.
[13] UN Women. (2019). Gender in Humanitarian Action (GiHA) Working Group (WG)
[14] Climate Change Commission (2010). National Climate Change Action Plan 2011-2028

	to be able to access to most isolated and marginalised areas and people within communities.[15] Given the gender-based dispassionate affect for women and girls, this TA will address those gendered affects directly or indirectly by involve female policy makers and administrative officers in designing DRR measures which reflect gender aspect and local context.

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
Ministry of Higher Education, Science and Technology	The Ministry of higher Education, Science and Technology is the Nationally Designated Entity to the CTCN. It is tasked with the climate-resilient and climate-smart development. The Ministry of higher Education, Science and Technology will be approached and consulted to guide the development of the TA as well as overseeing the progress of the TA once it is implemented.
The National Institute for Disasters Management (INGD), Sofara Province	The INGD Sofala province is a provincial authority responsible coordinating disaster risk management at the provincial and district levels as well as the community levels. It formulates plans and policies for disaster risk reduction and coordinates their implementation. They developed evacuation plan including "Timeline Action Plan" and will disseminate it to provincial institutions and community and have a plan to develop early warning system in collaboration with the concerned stakeholder,s thus this TA is compliance with their initiatives. They will be approached primarily during the hands-on training phase of the technical assistance. It will also be central to conducting the training at the local level. Other involvement includes interpreting the data obtained from the software into relevant policy.
National Directorate of Water Resource Management (DNGRH)	The National Directorate of Water Resource Management (DNGRH) is the body of the Ministry of Public Works, Housing and Water Resources (MOPHRH), responsible for the Management of Hydrographic Basins, Hydraulic Works and International Rivers.[16]

12. SDG Contributions:

[15] We Effect. Gender Transformative Disaster Risk Reduction
[16] development aid National Directorate of Water Resources Management

CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

Technical Assistance Response Plan – Terms of Reference

*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	
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, 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	The technology would foster the development of infrastructure that are resilient against extreme weather events and enhance society's adaptative capacities.
10	Reduce inequality within and among countries	
11	Make cities and human settlements inclusive, safe, resilient, and sustainable	The technology piloted will be utilized to develop resilient societies adapted to climate change
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	The technology will strengthen society's resilience against hazards by enabling the systematic analysis of risk-prone areas to inform relevant, robust countermeasures.
	13.2 - Integrate climate change measures into national policies, strategies, and planning	
	13.3 - Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	The information and data obtained using the technology would not only be used to raise awareness of preventative measures and improve societal preparedness but also enable the deployment of early warning systems at key sites.
	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	☑	☐
☑ 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	☐	☐

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.

Annex 1: Guidance note for designing a Response Plan (to be deleted when submitting the Response Plan)

1. Objective of the Response Plan

The Response Plan is developed by CTCN specialists in response to a country request for technical assistance. It constitutes the Terms of Reference of the CTCN technical assistance that will be provided to the country, and it provides the formulation of and subsequent basis for the monitoring and evaluation of the Response Plan implementation, as well as its expected outcomes and anticipated impacts.

2. Results chain and Logical Framework Approach to be defined in the CTCN Response Plan

The result chain is the causal sequence that stipulates the necessary flow of actions and processes to achieve desired objectives and results – beginning with inputs, moving through activities and outputs, and culminating in individual outcomes. The outcome will contribute to the desired impact in the society. The Logical Framework Approach is an analytical process used to support objectives-oriented project planning and management. It provides a set of pre-defined concepts which are used as part of an iterative process to aid structured and systematic analysis and management of the CTCN technical assistance.

3. Role of the Response Planning Design Team

The Response Planning Design Team is selected by the Climate Technology Centre (CTC). The composition of the team depends on each request but may include the National Designated Entity (NDE), the request Proponent, Climate Technology Manager of the CTCN, experts from the CTCN Consortium, UNIDO and UNEP experts from regional offices and other experts as needed.

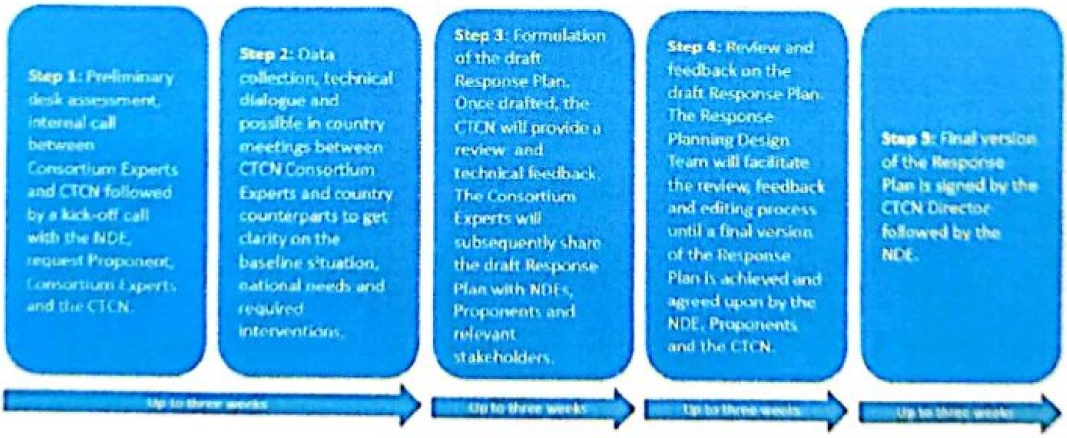
The role of CTCN Consortium experts is to lead the design of the Response Plan. The NDE will provide overall guidance on national context and priorities whereas the request Proponent will provide more detailed information on the sector, barriers and requested assistance. The Climate Technology Manager of the CTCN will provide quality assurance of timeliness and appropriateness of the Response Plan.

The Response Planning Design Team will draft all sections of the Response Plan template building on the information contained in the CTCN Request, based on expertise on the given topic and potentially further data collection, as required. This will be done by the CTCN Consortium Experts in consultation with the NDE, request Proponent and relevant stakeholders. The Response Plan must be agreed to and approved by the NDE and the CTCN Director. This Response Plan will serve as the basis to identify, select, and engage an expert institution from the Climate Technology Network or Consortium to lead the implementation of the CTCN Response Plan in the requesting country.

To the extent possible, staff from UNEP and UNIDO Regional, Sub-Regional and/or National Offices should be involved in all stages of formulation of the Response Plan to maximize synergies and avoid overlap with ongoing initiatives, as well as ensure relevance to regional and national context.

4. Process for designing the Response Plan

The Response Planning process should be completed over a period of up to 60 working days (12 weeks). Indicative steps and related timelines are laid out below:



5. Design Considerations

To maximize the impact of the technical assistance provided by the CTCN and provide an effective M&E process, the Response Plan should integrate as much as possible the considerations below:

Climate Technology focus: The Response Plan should have a clear focus on climate technologies, and identify activities that enable the identification, development, deployment, or diffusion of one or several specific technologies (including equipment, techniques, knowledge, and skills).

Barrier removal / Problem solving: The activities should contribute to address the specific problem statement identified in the Request. The barriers identified should be those hampering the identification, development, deployment, or diffusion of one or several climate technologies or climate actions. Therefore, it may be necessary to limit the CTCN Response Plan to a set of activities for technical assistance commonly agreed with the NDE (and Proponent when needed) compared to the original request submitted. The CTCN will liaise with NDEs and Proponent in case the scope of the technical assistance deviates from the original request.

Use of the CTCN assistance by stakeholders: The Response Plan should identify clearly how the products of the CTCN assistance will be used in the short term once support is delivered, by who and when, to ensure it will lead to specific impacts in the country. The activities should engage the stakeholders that will use the concrete results of the assistance to deploy the technologies, including from the private sector, the public sector, research institutions, etc.

Within the scope of CTCN resources: The cost of the technical assistance provided by the CTCN cannot exceed USD 250,000 per Response Plan. Therefore, it may be necessary to prioritize activities and limit the CTCN Response Plan to a set of priority activities commonly agreed with the Proponent and the NDE to remain under this value. Under section 4 of the Response Plan template, an indicative activity-based budget should be presented. The proposed budget is indicative and should present an estimated costing range per activity, output as well as a total costing range for the delivery of the Response Plan. Once the Response Plan is finalised and published for tendering, interested parties will provide competitive offer against the indicative budget.

CTCN activities and outputs should be linkable to monitoring and evaluation indicators: All proposed activities and outputs must be linkable to monitoring and evaluation indicators that are specific, measurable, achievable, relevant, and time bound. The monitoring and evaluation process and corresponding indicators will be developed by the Lead Implementer as part of the work plan and will allow the CTCN technology Manager to monitor the timeliness and appropriateness of the implementation.

Synergies with existing efforts: The Response Plan should focus on activities that are not already being fully supported or that are in the process of being fully supported by another national, regional, or international organization. Synergies and complementarity also require that the CTCN assistance is not duplicating past activities. It is possible in the Response Plan to indicate co-financing from the government, the Proponent, or another stakeholder, that will maximize the effectiveness of the CTCN assistance.

Gender mainstreaming: The CTCN mission is to build or strengthen developing countries' capacities to identify technology needs, to facilitate the preparation and implementation of technology projects and strategies considering gender considerations. The Response Plan must therefore describe how gender considerations will be included and monitored within the proposed activities, and any gender co-benefits that will be gained because of implementing the CTCN technical assistance.