ADAPTATION FUND

UN environment programme

CTCN CLIMATE TECHNOLOGY CENTRE & NETWORK

Adaptation Fund Climate Innovation Accelerator

Project Concept Note - Technical Assistance Response Plan

Country:	**Ecuador**
# application:	**AF-2022000163**
Title:	Implementation of improvements to the National Drought Monitor of Ecuador(MONSE) for the integration of a drought risk scenario module.
END	Ministry of Environment, Water and Ecological TransitionKarina Maribel Barrera Moncayo Undersecretary for Climate Change
Project proponent	National Institute of Meteorology and Hydrology (INAMHI)Bolívar Andrés Erazo Maldonado Executive Director

Summary of CTCN technical assistance

Ecuador has a drought problem and given the close relationship that the climate system has with the country's economic, social and agro-productive development, drought has become synonymous with disasters, financial recession, migration and poverty, with the agro-productive sector, the hydroelectric sector and the water and sanitation sector being the most affected.

Therefore, it is imperative to develop tools designed for drought monitoring, early warning and assessment that allow decision-makers at national, sub-national and local levels to monitor spatially and temporally, the probability of occurrence of severe droughtepisodes in Ecuador and to implement corrective actions.

As part of the National Drought Plan, there is a tool called "Monitor Nacional de Sequía (MONSE)" which at the moment only issues maps that detect the current state and evolution of drought. The integration of a module that evaluates the probability of occurrence of drought events to the current National Drought Monitor of Ecuador will allow timely decision making to address potential drought episodes. This technical assistance will contribute to:

- The integration of a module that presents drought occurrence scenarios using parametric statistical methods as an input for the generation of drought risk scenarios is an important step in the development of drought risk scenarios.
- Definition and prioritisation for the incorporation of at least one additional indicator to those dy implemented in the current MONSE.
- Generation and visualisation of drought scenarios with time horizons of 3, 6, 9 and 12 months
- Extend the current resolution of MONSE (28 km) to the maximum possible.
- Bias correction to refine MONSE using information from volunteer observers, ground stations and drought impact information from different sectors
- Training of officials from INAMHI, MAATE and other institutions to ensure understanding of the monitor and its use.
- Identification of the weights of each current and future indicator in MONSE.
- Generation of drought reports or bulletins.
- The definition of an action / mitigation plan to increase the resilience of affected communities.
- The promotion of the country's national innovation system through the articulation of different relevant actors for the reduction of drought impacts.
- Definition and prioritisation of specific products (such as newsletters; among others) for sectors interest such as agriculture, energy, drinking water, among others.
- Identification of volunteer observers in the framework of the Volunclima platform for the assessment and continuous improvement of MONSE
- Coordination of the Drought Task Force tables to assess the risk and discuss actions and generate participatory newsletter.

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Agreement:

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

Designated National Entity (DNA) of the Technology Mechanism of the UN Framework Convention on Climate Change (UNFCCC).
United Nations Framework Convention on Climate Change (UNFCCC)
Name: Karina Maribel Barrera Moncayo
Position: Undersecretary for Climate Change
Signature:

Electronically signed by:
KARINA MARIBEL MONCAYO BARRIER

Project proponent

Name: Bolívar Andrés Erazo Maldonado
Position: Executive Director of the National Institute of Meteorology and Hydrology
Date: 26/10/2023
Signature:

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BOLIVAR ANDRESERAZO MALDONADO

CTCN

Name: Rajiv Garg
Position: Director of the CTCN (a.i.)
Date: 26/10/2023
Signature:

1. Background and context

The Intergovernmental Panel on Climate Change (IPCC) refers to drought as a period of abnormally dry conditions over a prolonged period of time causing severe hydrological imbalance. The term drought is relative and depends on many factors that make it area-specific; however, it can also be considered as a slowly developing hazard, characterised by the total or partial absence of rainfall overa period of time.

In this regard, the World Health Organisation (WHO) estimates that 55 million people worldwide are affected by droughts every year, which has made this phenomenon a serious danger to the sustainability of the links that govern a nation's development. Water scarcity currently affects 40% of the world's population and, according to FAO (2015), at least 700 million people are at risk of being displaced as a result of droughts by 2030.

In the case of Ecuador, the problem of drought is not alien to the global reality. Due to the close relationship that the climate system has with the country's economic, social and agro-productive development, drought has become synonymous with disasters, migration, financial recession and poverty, with the agro-productive sector, the hydroelectric sector and the water and sanitation sector being the most affected.

Thus, in the 70s, 80s and 90s, Ecuador faced several episodes of drought that covered a considerable section of the coastal and highland territory, which caused great losses in agriculture, small and medium industry, human migration events, as well as the affectation of the hydroelectric production system.

Recent information estimates that economic losses in the agricultural sector due to drought amount to US$424,568,387 million during the period 2000 - 2017. Therefore, about 18% of the territory is under "High" and "Medium" susceptibility to drought. The provinces most likely to be affected by drought are Manabí, Santa Elena, Guayas and Loja.

Similarly, in February 2022, due to a critical drought in the province of Loja, a Resolution C.O.D. Declaration of Emergency was established by the National Assembly of Ecuador, in which Article 1 requests the President of the Republic, Mr. Guillermo Lasso Mendoza, to declare a state of emergency on ecosystems vulnerable to climate change that are currently experiencing a water deficit at the national level, which has seriously affected the economy of the agricultural and livestock sector.The Ministry of Environment, Water and Ecological Transition, together with the Ministry of Agricultureand Livestock, and the National Service for Risk and Emergency Management, are also required to apply immediate measures with contingency public policies, programmes to execute works related to irrigation and water resources management; expansion of irrigation channels; and alternatives for the mitigation of the problems derived from the drought that are affecting the territories that have been hit by it, such as the dry forests.

Although the National Drought Monitor is a tool that contributes to the monitoring of the current state and evolution of past drought episodes, it is imperative to develop tools that allow decision makers at national, subnational and local levels to know the probability of occurrence of drought episodes in Ecuador and to implement the necessary measures as appropriate.

2. Problem statement

As mentioned in the previous section, although a pilot version of MONSE exists, it needs to be strengthened and consolidated, for which a series of actions have been identified that focus on:

1. Strengthening MONSE to incorporate a scenario module

MONSE is currently hosted on temporary servers at the International Centre for Research on El Niño Phenomena (CIIFEN), for which, in order to provide sustainability and institutionalisation, it is necessary to migrate MONSE to the National Institute of Meteorology and Hydrology, INAMHI, but establishing a backup for the operation of MONSE on CIIFEN's servers.

2. Improved resolution of results.

The pilot version of MONSE is currently generating results based on information from remote sensing and reanalysis[1] to obtain combined indices for the determination of drought. In order to reduce the uncertainty of the results, it is necessary to integrate field information produced by INAMHI's meteorological and hydrological stations that are combined with the results of remote sensors and reanalyses for greater credibility on the part of users of the results generated by MONSE.

Similarly, the extension of the Volunclima Network[2] in areas where drought has historically been known to occur, such as the provinces of Manabí and Loja, could contribute to reducing the uncertainty of the combined indices applied by MONSE and, through field measurements of precipitation and soil conditions, contrast them with the MONSE results so that these can be visualised on the platform.

3. Establishment of climate services.

The impacts of drought are transversal to all productive and economic sectors of the country. Thus, it is essential for MONSE to address, through bulletins, scenarios, among others, the different information requirements that the productive and economic sectors demand in order to face a severe drought episode. Some of these sectors necessarily require the establishment of their own drought affectation thresholds, which could potentially be focused on sectors such as agriculture, livestock, hydroelectricity, water and sanitation, among others.

4. Improvement of the MONSE platform/interface and development of climate products and services to provide information that contributes to decision-making, including integration with existing INAMHI services to ensure the sustainability of MONSE.

As already mentioned, the pilot version of MONSE offers a very basic visualisation of results without additional added value for decision making in drought. Therefore, an essential part of MONSE is the access to climate services that it can offer to different users in Ecuador (central/decentralised level, local users and academia). Thus, enhancing the climate products and services of the MONSE platform with a scenario module will provide timely and necessary information for decision making at all levels.

[1] Currently, the pilot version of MONSE uses data sources from Rainfall Estimates from Rain Gauge. and Satellite Observations (CHIRPS), Climate Prediction Center (global monthly land Surface air temperature analysis), MODIS-Terra satellite.

[2] ~~The Volunclima Network is a network of~~ volunteers who monitor rainfall and drought impacts at the local level. through rainfall and soil measurements *in situ* to compare them with the results obtained by MONSE.

Improvement of the National Drought Monitor in Ecuador (MONSE) through the integration of a drought risk scenario module.

3. Logical framework for CTCN technical assistance:

In order to carry out the present Logical Framework of the technical assistance, a key decision making committee will be formed with voice and vote that will include MAATE, INAMHI, the implementer and with technical/scientific advice from CIIFEN (with voice, but without vote). This Committee will be responsible for making key decisions related to the implementation of this technical assistance and for the approval of technical assistance products.
(Guidance: Note that multiple activities can lead to one "output" and multiple outputs can lead to one "outcome". While there may be multiple outputs, only one outcome can be described that captures CTCN technical assistance. Deliverables" are products or services to be provided based on the "activities" and "outputs").

Objective**: describe the objective of the technical assistance in one sentence. The objective of CTCN technical assistance reflects what is expected to be achieved and what impact is sought through the assistance.* ***Improve the national drought monitor (MONSE) to generate risk scenarios and monitor the evolution of drought episodes for risk management in the territory by integrating a scenario model obtained through the use of statistical parametric methods, digital and machine learning.
Outcome: *(Guidance: The outcome expresses the changes in institutional and behavioural capacities for climate technology development or deployment to which the technical assistance contributes. Activities and outputs contribute to the outcome, but the outcome is not under direct control of CTCN activities). (maximum 400 characters including spaces).* **The technology concept will complement INAMHI's efforts to contribute to Goal III, concerning "Priority actions for drought risk reduction under the National Drought Plan.** **The National Drought Monitor will improve its performance through analysis of historical data, daily observations and remote sensing information to derive general and specific impact and adaptation models for drought events in Ecuador.** **The proposed technology will contribute to improved drought risk management and provide practical knowledge and skills for effective data digitisation and analysis for impact and adaptation modelling.**

	Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Output 1: Work plan and related communication documents developed.															
Activity 1: *All implementers must carry out the following activities at the beginning and at the end of the CTCN technical assistance.*															

i) A detailed work plan of all activities, deliverables, outputs, timelines and responsible organisations/persons, as well as a detailed budget for the implementation of the response plan. The detailed work plan and budget should be based directly on this response plan and include adjustments agreed with the Designated National Entity, the applicant and the coordinator of this technical assistance at CTCN. ii) Based on the indicators listed in the closure and data collection report, a monitoring and evaluation plan with specific, measurable, feasible, relevant and time-bound indicators used to monitor and evaluate the timeliness and adequacy of implementation. The monitoring and evaluation plan should enable the implementer to complete the CTCN closure and data collection report at the end of the technical assistance (see item iv) and section 14 of the Response Plan); iii) A two-page description of the expected impact of the CTCN technical assistance at the beginning of the assistance and updated at the end of the technical assistance (a template will be provided); iv) A CTCN closure and data collection report at the end of the technical assistance (a template will be provided). Activity v: AFCIA Results tracker will need to be filled at initial stage (baseline), mid term and completion. Activity vi: a gender assessment that will include at least the following components: i) Gender Disparities Analysis (evaluate the status of gender disparities in the project's context, including socio-economic, cultural, and institutional factors. Identify areas where inequalities exist etc) ii) Data Collection (collect and analyse gender-disaggregated data to understand the specific needs and preferences of different genders). iii) Gender-Responsive Design (assess the project's design to ensure that it considers the different roles, responsibilities, and interests of various genders. Consider how the project can empower marginalized genders and promote gender equality.) iv) Gender and Innovation ecosystem (assess how the technology could foster women as entrepreneurs) iv) Gender Budgeting (budget allocation to target gender mainstreaming activities. Also ensure that gender-specific needs are adequately funded). v) Capacity Building vi)Monitoring and Evaluation (shall include regular gender-sensitive assessments to track progress and adjust as necessary.															
Deliverables 1:															
D.1.1 Work plan	X														
D.1.2 Monitoring and evaluation plan	X														
D.1.3 Impact description document (initial and final version)	X														x
D.1.4 Closure and data collection report															X
D.1.5 AFCIA Results tracker (initial, mid-term, completion)	X								x						

D.1.6 Gender Assessment	X							X						X	
Output 2: Diagnosis of the National Drought Monitor and development of a proposal for improvements.															
Activity 2.1: Mapping of actors in the operation and management of MONSE *Mapping will be limited to Climatic, Hydrological and Agrometeorological information generated by INAMHI or third parties reporting data to MONSE.* i) Identify the actors involved in the data generation process, including decentralised bodies and the private sector. Validation of stakeholder mapping with the focal point of INAMHI and MAATE. ii) Identify for each actor, the type and use of information generated, responsibilities for data generation and reporting, quality controls, type of processing and analysis, reporting, and maintenance of observation stations. iii) Establish and apply a matrix of criteria to assess the capacities of the agencies that generate and report data to MONSE and the quality of the information reported. iv) Formation of a working group that will be made up of public and private institutions and academia for the accompaniment, information gathering and validation of the methodological approach for the fulfilment of the objectives of this technical assistance. v) Formation of the Drought Working Group to assess the risk by sector, discuss the															

actions and generate participatory newsletters															
Activity 2.2: Identification of current and emerging priorities and needs of internal and external users i) Identification of internal and external users and types of uses of climatic, hydrological and agro-meteorological information. Validation of the mapping of users and types of uses with the Committee. ii) Propose and apply a matrix of questions to establish the current and emerging priorities and needs of users through virtual interviews and/or surveys, considering gender, intercultural and intergenerational approaches. Definition and prioritisation of specific products for sectors of interest such as agriculture, energy, drinking water and others. iii) Grouping the results by type of user and drawing up a report of conclusions.														
Activity 2.3: Gathering of information on the current situation of INAMHI networks and Volunclima members, as well as relevant ongoing initiatives i) Organise virtual meetings with MONSE managers to understand existing processes and information platforms. ii) Update of the inventory of observation points of INAMHI and third party networks, through the review of secondary information and the application of surveys and/or virtual interviews with actors identified in activity 2.1. iii) Assessment of the status of observation points and quality of information generated through review of reports, surveys and/or virtual interviews. iv) Identify ongoing national and local government and private sector initiatives to optimise the observation point network. v) Identify deficiencies and gaps in INAMHI's and third party observation networks, in terms of operability, quality of information, data capture, processing and analysis systems, among other components of INAMHI's networks.														
Activity 2.4: Diagnostic survey on the current status of observation points and quality of information, gaps, deficiencies, as well as future perspectives according to plans of optimisation for analysis.															
Activity 2.5: *Development of a proposal for improvements to MONSE that minimally considers:* i) Technological improvements to increase the reliability of MONSE results and products. ii) Management improvements. iii) Budget and technical staff for the operation of MONSE.															

Deliverable 2:															
D.2.1 Map of actors including generators, administrators, and users of information, classified according to type of information and their role in the operation of the observational system and creation of a stakeholder group. work. List of the working group with name of the institution, contact, position, gender.			X												
D.2.2 Capacity assessment matrix of agencies generating and managing Climate and Hydrological information for MONSE			X												
D.2.3 Report on current and emerging priorities and needs for climatic, hydrological and hydrological information.			X												
D.2.4 Diagnostic report on the current status of observation points and quality of information, gaps, deficiencies, as well as future perspectives according to optimisation plans for analysis.			X												
D.2.5 Development of a preliminary proposal for improvements.			X												
Output 3: Establishment of criteria for the optimisation of MONSE using INAMHI's internal guidelines and regulations and the integration of the drought scenario module including sector-based thresholds.															
Activity 3.1 Implementation of the proposal for improvements to MONSE that minimally considers: • The integration of a module applying INAMHI's internal regulations for the development of software that presents drought occurrence scenarios using parametric statistical methods as an input for the generation of drought risk scenarios that consider the definition of thresholds according to the sector. • Definition and prioritisation for the incorporation of at least one additional indicator to those already implemented in the current MONSE. • Generation and visualisation of drought scenarios with time horizons of 3, 6, 9 and 12 months. • Reduce the resolution of the current MONSE (28 km) to the maximum possible. • Bias correction to refine MONSE using information from volunteer observers, ground stations and drought impact information from different productive sectors in the country. • Identification of the weights of each current and future indicator in MONSE. The scenario module is required to integrate as a minimum: • Scenarios for 3, 6, 9 and 12 months. • A platform that allows for the integration of mixed data from satellites, satellite data, satellite data and															

existing and operational sensors as well as data collected through the Volunclima network. • The possibility and relevance of using *machine learning* as a tool in the drought scenario generation system will be analysed. • The platform is required to be designed to be hosted in cloud services under INAMHI's internal regulations (development guidelines, programming language usage policy, architecture guidelines) and to be transferable to INHAMI within 3 years. The first 3 years (of cloud services for testing and production) will have to be funded by INAMHI. implementer.															
Activity 3.2: Feedback and validation of the proposed improvements with the Committee and working group At least one face-to-face workshop will be organised with the Committee and other interested institutions to present the proposed criteria and principles for improving the functioning of MONSE and adding the scenario module.															
Activity 3.3 Definition of the system architecture The design will be national in scale, although incorporating, where relevant and where sufficient information is available, developments at the regional or provincial level (Ecuador is divided into 24 provinces). For reasons of design cost rationality, a parish scale will not be analysed. The design should consider the international reference framework, and existing and emerging technologies for a time horizon to 2030. The system architecture shall be defined taking into account the following: • Design of the scenario module (3, 6, 9 and 12 months) for MONSE. • Integration of information derived from INHAMI weather stations. • Integration of data from existing sensors. • The integration of data collected by the Volunclima NETWORK and collected through SMS or any other way that is technologically possible, efficient and adapted (technologically and financially) to the capacity of the country. • The integration of satellite data.														

• The integration of *machine learning* if deemed appropriate and relevant. • Emerging and innovative cost-effective technologies will be identified, as well as the necessary software for continuous monitoring. The design of a hybrid predictive model is expected. • The operation and maintenance of MONSE will be detailed. • Elaboration of design scenarios with various technological alternatives (hybrid predictive models) and stages for the staggered implementation of the network, prioritising areas and/or types of uses with different levels of accuracy and robustness. For example, with a reference level with high quality stations for the most demanding applications, but also a more inclusive, incorporating low-cost third party stations and non-conventional data (e.g. video and real-time observations from the Volunclima Network). • Integration of complementary sources of satellite information, reanalysis, information observed in meteorological stations to obtain the combined drought affectation indexes.															
Activity 3.4: Workshop to present the system architecture to the working group A workshop will be organised to present and discuss the system architecture to the working group. This workshop will detail the essential components that the system will need to function efficiently. It will also detail the limits of the system, possible risks, possible improvements and any other aspects of the system.																
Activity 3.5 Review of the architecture based on feedback received from the working group (x3) The system architecture will be modified to incorporate the recommendations of the working group a maximum of 3 times. Between each modification, a new working meeting will be organised to present the modifications to the system and how such modifications respond to the defined requirements.																
Deliverables 3:																
D.3.1 Document detailing principles and criteria for the optimisation and redesign of the MONSE				X												
D.3.2 Report on face-to-face workshops, including list of participants, data disaggregated by gender, geography and other relevant documentation.						X										
D.3.3 Initial architecture of the MONSE Predictive Module						X										
D.3.4 a Module with drought probability scenarios including the definition of thresholds according to sectors.						X										

D.3.4 b three additional indicators to the ones included in current MONSE.						X									
D.3.5 a Extended MONSE resolution.						X									
D.3.5 bMONSE bias correction report.						X									
D.3.5 c Establishment and validation of weights of current and future indicators to be used by MONSE.						X									
D.3.4 c Summary of the meeting(s) with the working group and list of recommendations/modificationsto be integrated.							X								
D.3.5 d Final architecture of the MONSE scenario module.								X							
Output 4: Newsletters generation and Drought Task Force establishment															
Activity 4.1: Development of a module for the generation of bulletins to be integrated into the existing platforms of INAMHI and MAATE and mirrored in those of the Drought Task Force. i) Face-to-face meeting with the Drought Working Group to define the characteristics of the bulletin and the information to be included. ii) Preliminary design of the newsletter.															
Activity 4.2: Workshop to demonstrate the platform to the working group i) Face-to-face meeting with the Drought Working Group to present the functionality of the platform and feedback. The following should be considered as a minimum for this activity: • The workshop will last a minimum of 3 hours. • Computers will be rented to ensure that each member of the working group can test, navigate the platform. • We will clarify doubts and identify bugs and things to improve. • At the end of this session, users and passwords will be given to each member of the working group to test the module. • For 6 months, users will be able to report bugs, improvements, malfunctions. • The required modifications will be made to the system on an ongoing basis.															
Activity 4.3 Development of a manual for the operation of the platform An explanatory manual will be developed and provided to the members of the working group in digital and paper format.															
Deliverables 4:															
D.4.1 a Implementation of the newsletter module in MONSE								X							

D.4.2 a Formation of the drought working group **D.4.1. b** Generation of at least 5 participatory newsletters with the working groups **D.4. 2. b** MONSE predictive module demonstration workshop 6-monthplatform test report (improvements made). **D.4.3:** Platform operation manual**.**								X						X
Output 5: Institutional management model for dealing with drought-related events.														
Activity 5.1: Update the management model based on the experience of the formulation of the National Drought Plan.														
Activity 5.2: Identification of volunteer observers for impact assessment and continuous improvement of MONSE.														
Deliverable 5: Report with information on volunteers to expand the network of observers in the framework of Volunclima.														
D.5.1 The status of the creation of a Drought Observatory (reporting to the MONSE National Drought Monitor) will be analysed with public, private and civil society actors involved in drought issues. The report will also propose recommendations that could help to reinforce this initiative.												X		
D.5.2 Proposal for the extension of voluntary observers for impact assessment and continuous improvement of MONSE.												X		
Output 6: MONSE business and financial sustainability model.														
Activity 6.1: Financial study and recommendations for the financial sustainability of MONSE Preparation of recommendations for INAMHI and the entities involved in data collection for the long-term sustainability of MONSE. These recommendations will include options of mechanisms for self-sustainability (sale of data and services) and funding from public and private sources														
Activity 6.2: Socialisation event of assistance results Face-to-face workshop (maximum 30 participants) for presentation of results to key actors in the operation, administration and representatives of sectors using MONSE information.														
Deliverables 6:												X		
D.6.1 MONSE financial and sustainability study												X		
D.6.2 Technical assistance closing workshop report and photographic evidence, minutes and videos											X			

4. Resource requirements and budget breakdown:

Provide an indicative summary of the resource requirements and the disaggregated budget required to implement CTCN technical assistance, including monitoring and evaluation activities, using the table below. It is important to note that a minimum of 1% of the budget should be explicitly directed to gender-specific activities related to technical assistance (see section 10 for more information on gender). Once the response plan is completed, the Climate Technology Centre (CTCN) will select the implementers responsible for the implementation of the response. The CTCN and the selected lead implementer should agree on a detailed activity budget.

Activities and products	**Input: Human resources** *(Position, function, estimated number of days)*	**Input: Trips** *(Purpose, domestic/international , number of days)*	**Input: Meetings and events** *(purpose of the meeting, number of participants, number of days)*	**Input: equipment and material** *(purpose, item, purchase/rental, quantity)*	**Estimated cost** *Indicate the cumulative costs of activities and outputs and provide a range of estimated costs for each activity and the entire cost plan. response.*	
					Minimum	**Maximum**
Output 1: Development of the plan work and documents of communication related	*LE 8* *EI1 3* *EI2 3* *EI3 1* *EN1 1* *A1 1* *A2 1*	*None*	*None*	*None*	5,000	7,500
Output 2: Diagnosis of the National Monitor Drought and development of a proposal for a improvements	*LE 12* *EI1 6* *EI2 2* *EI3 0* *EI3 14* *EN1 14* *A1*	*None*	*None*	*None*	25,000	35,000

	A2	*14*					
Output 3: Establishment of criteria for the optimisation of the MONSE using the guidelines and regulations internal INAMHI and the integration of the module of scenarios of droughts including thresholds as a function of of the sectors.	*LE* *EI1* *EI2* *EI3* *EI3* *EN1* *A1* *A2*	*2* *8* *3* *0* *0* *2* *2*	*International travel for the Team Leader and 3 experts, and national travel for two local experts.*	*Face-to-face workshops (2) for validation of design criteria (activity 3.2).* *1 day, 4 international and 2 national consultants, maximum 20 participants per workshop.*	*Workshop materials on-site*	20,000	35,000
Output 4: Newsletter generation and Drought Working Group	*LE* *EI1* *EI2* *EI3* *EN1* *A1* *A2*	*16* *30* *22* *0* *14* *10* *8*	*None* *International travel for the Team Leader and 3 experts, and travel national for two local experts*	*None* *Face-to-face training workshop for module operation predictive* *1 day, 4 consultants international and two national, and maximum*	*Computers for test the module.*	*25,000*	*35,000*
Output 5: Report with information from volunteers for expanding the network of observers in the Volunclima framework	*LE* *EI1* *EI2* *EI3* *EI3* *EN1* *A1* *A2*	*15* *15* *4* *24* *4* *12* *4*	*None*	*None*	*None*	*15,000*	*20,000*
Product 6: Model	*LE*	*3*		*30 participants*	*Workshop materials*	*10,000*	*12,500*

business and financial sustainability of the	*EI1 9* *EI2 9* *EI3 1*			*on-site*		

MONSE.	*A1 3* *A2 12*					
Estimated cost range for the entire response plan					100,000	145,000

5. Profile and experience of experts

Based on the human resource needs identified in section 4 (Resource requirements and budget breakdown), provide a description of the required profile of all experts who will be involved in the implementation of the CTCN response plan.

Experts needed	Brief description of the profile required
Team Leader (LE)	Geography, agronomy, forestry, civil engineering or related with M. Sc in climate change, water resources, agriculture, sustainability and/or environmental management or related areas. Minimum 18 years of professional work experience. Minimum 12 years of experience in the design, evaluation and implementation of public policies and/or national action plans in the environment sector. Experience in the area of climate change and SDGs. Experience in the design of national Monitoring and Evaluation and/or Monitoring, Reporting and Verification (M&E and/or MRV) systems. Demonstrable knowledge of the role and content of NDCs and National Adaptation Plans. Experience working with public entities, private sector and international cooperation. Desirable experience in adaptation issues in the Water and Agriculture sector. Experience in the coordination of highly complex projects involving the management of interdisciplinary work teams and the consultation of different types of stakeholders. Experience At least 3 years of work experience in Latin America. Fluency in Spanish and English required.
Front-end/back-end developer (EI2)	At least 8 years' experience in defining interfaces for digital information systems. At least 5 yearsof experience to prove it.
Technology information designer	At least 8 years' experience in defining interfaces for digital information systems. At least 5 yearsof experience to prove it.
Data processing advisor	• Statistician, mathematician with more than 8 years of experience in the development of specialised methods and techniques for the management, exploration, modelling of multiple quantitative and qualitative variables in multivariate data analysis. Development of regression models for quantitative, categorical and multivariate data analysis. • Develop and manage relational and dimensional databases with quality criteria for appropriate statistical analysis. • Apply the mathematical theory of stochastic processes and use this theory in time series. Ability to programme computational solutions and database management.
National Meteorological Adviser	Engineer, Hydrologist, Meteorologist, Climatologist, Agronomist, Ecologist, or related, climate services,

(A1)	o water resources, o environmental sustainability and/or management, o climate risk management, o climate change or related areas Minimum 8 years of experience in the agricultural sector. Experience in determining the effects of hydro-climatological variables on the yields of the most relevant cropping systems in Ecuador. Experience in the systematisation of processes and elaboration of highly complex reports involving consultation of different types of actors. Experience working in groups and different participatory methodologies. A national or international advisor with the required training and experience may be chosen, Fluency in Spanish and advanced level of English.
National Advisor on Communications and Gender (A2)	Communicator / Anthropologist / sociologist or related with at least 8 years of work experience in the design of participatory workshops, design and moderation of focus groups, and design of instruments and application of research techniques such as in-depth interviews and surveys. Experience of at least two years or at least two projects in the design and implementation of social research, inclusion and mainstreaming of gender perspectives. Experience in creating texts and narratives for different audiences within public and private organisations and diverse social groups. Experience in the systematisation of processes and elaboration of highly complex reports that involve consultation with different types of actors. Desirable knowledge of climate change adaptation projects. Fluent Spanish and intermediate level of English are required.

6. Contribution planned at expected impact of technical assistance

The assistance will provide an institutionalised National Drought Monitor of Ecuador that allows monitoring and forecasting the evolution of an ongoing drought episode and whose information is essential for the generation of climate services that allow the general population through mobile or web applications to access the necessary information to generate timely responses at all levels in the face of this climatic threat.

The integration of a modern, optimised, comprehensive, multi-level and multi-purpose predictive module to MONSE will provide reliable and timely information to respond to drought events that particularly affect the agricultural and water supply sector, with the possibility of extending its use to other sectors such as risk prevention.

The institutional management and financial sustainability strategy resulting from this assistance will allow for the identification of funding mechanisms and options to ensure the long-term sustainability of MONSE.

7. Relevance for nationally determined contributions and other national priorities

The NDC discloses the following:
Droughts, frosts and extreme weather events have caused in the past, and could cause in the future, reductions and/or losses in agricultural, fisheries and aquaculture production, foreshadowing the potential impacts that will eventually intensify with the threat of climate change.
Impacts will continue to increase, especially those associated with the El Niño phenomenon, prolonging periods of low rainfall in the central Andes and the Coast, and increasing flooding in the Coast towards the southern Andes.

The drought plan mentions the following:
Based on the above, the National Drought Plan, as part of its proposal and contribution to the achievement of its goals, managed with the support of CIIFEN, the implementation of the National Drought Monitor of Ecuador (MONSE). The main objective of the implementation of the National Drought Monitor of Ecuador (MONSE) is to systematically collect data in order to identify and provide early warning of the presence of a drought in the Ecuadorian territory.

8. Relationship with relevant parallel activities:

This proposal is based on the development of the First National Drought Plan of Ecuador, whose construction involved around 200 people from public and private institutions and academia in different participatory spaces. One of the core parts of this instrument was the establishment of a drought management model, in which the initial trigger for this management model is the National Drought Monitor, which makes it possible to recognise a potential ongoing affectation due to this climatic threat and to activate the consequent instances established by the Emergency Operations Manual of the National Secretariat for Risk Management (SNGRE).

The proposal used inputs generated by the Regional Project ENANDES: Floods and Drought, funded by EUROCLIMA+ and implemented by CIFFEN in close coordination with the Ecuadorian Government. A pilot version of MONSE was developed through this initiative and is intended to be subject to improvement through this proposal.

Due to the Emergency Declaration of February 2022 due to a La Niña episode that was underway at that time, the idea of generating the necessary conditions for the implementation of the National Drought Plan and tools to monitor and forecast the temporal and spatial effects of this climatic threat in the country gained momentum.
For this reason, and in compliance with the National Drought Plan, this proposal was prioritised as a tool to facilitate decision-making in the face of drought in Ecuador.

9. Follow-up activities foreseen after the conclusion of the technical assistance:

Describe the intended future use - after the completion of the CTCN implementation - of the outputs and deliverables of this technical assistance in order to contribute to the expected impact over time as outlined in section 6. For example, which organisations or stakeholders will use the outputs of the technical assistance after its completion, for what purpose, what will be the scale and scope of implementation of the outputs and deliverables, what next steps will be taken and when, etc. (maximum 2500 characters, spaces included). Following technical assistance, the country is expected to host the system at INAMHI, and to see if it can implement some of the recommendations on the National Innovation System and operationalise the drought plan.

10. Gender benefits and co-benefits:

Integrated into the design of activities:	The design of assistance activities will have a gender perspective by seeking and monitoring the inclusion of women in the work teams participating in this technical assistance. The gender dimension will be incorporated into interviews and surveys to identify impacts of climate change for women.
Benefits and co-benefits expected as a result of the activities:	MONSE's timely and predictive information on drought events is expected to support the country's preparedness to avoid or reduce impacts on communities. The benefits are in the minimisation of losses from timely risk management in the territory. For national government bodies

11. Main national stakeholders involved in the implementation of technical assistance activities:

With the help of the table below, list and describe the roles of the country stakeholders, participants and beneficiaries involved in the implementation of the assistance or consulted during the process.

National stakeholder	Role in the implementation of technical assistance
Designated National Entity: Ministry of Environment Climate Change Directorate	The Ministry of Environment, Water and Ecological Transition, through the Undersecretariat for Climate Change as the lead agency in climate change management, will supervise compliance and will be the coordinating body with the actors involved.
Vice-Ministry of Water	Positioning of MONSE as a a tool for water management in times of low water levels.
Ministry of Agriculture and Livestock	Positioning MONSE as a tool for the prioritisation of climate change adaptation actions in the face of drought in the agriculture and livestock sectors.
Ministry of Energy and Mines	Positioning MONSE as a tool for hydropower management in the country

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	in periods of low water levels.
National Secretariat for Risk Management	The National Risk and Emergency Management Service (SNGRE), as the coordinating body for emergencies and disasters in the country.
National Institute of Hydrology and Meteorology (INAMHI)	It is a technical body that in the national context is attached to the Ministry of Environment and Water; with technical and professional staff specialised in Meteorology and Hydrology, that contributes to the economic and social development of the country.
Ministry of Economy and Finance	State portfolio in charge of policy and financial system of Ecuador.
International Centre for Research on the El Niño Phenomenon (CIIFEN)	Technical advice for the implementation of improvements of MONSE.
Associations of small, medium and producers and the general public	Local beneficiaries of the newsletters and preventive measures in the event of a drought episode

12. Contribution to the Sustainable Development Goals (SDGs)

*Instructions: Please complete the grey section below for **up to three** SDGs to be promoted through this technical assistance. A full list of the SDGs can be found at the following link:* http://www.un.org/sustainabledevelopment/es/objetivos-de-desarrollo- sustainable/

Goal:	Sustainable Development Goal	Direct contribution from CTCN TA
1	End poverty in all its forms everywhere	The Technical Assistance will map drought risks through GIS and design an aquifer mapping architecture that will therefore support food security and increase the income of rural communities.
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	The TA will assess the vulnerability of the country define the water balance and identify the most suitable technologies to manage the water resources and recharge the groundwater in times of drought.
3	Ensure healthy lives and promote well-being for all at all ages	
4	Ensure inclusive and equitable quality education and promote lifelong 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, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support	
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	
9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	
10	Reduce inequality within and among countries	
11	Make cities and human settlements inclusive, safe, resilient and sustainable	
12	Ensure sustainable consumption and production patterns	
13	Take urgent action to combat climate change and its impacts	The system will consist of various aspects that will be useful for planning and implementation of timely measures in advance to droughts episodes
	13.1 - Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	This climate technology will help Ecuador to become more resilient to the effects of climate change.
	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 project includes numerous workshops, meetings and 6months of testing of the drought prediction model.
	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	The drought prediction system is a planning tool.
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	

	7.ha By 2030, increase international cooperation to facilitate access to clean energy research and technology, including renewables, energy efficiency and advanced and cleaner fossil fuel technologies, and promote investment in energy and energy infrastructure, including renewable sources of energy. clean technologies	
	7.b By 2030, expand infrastructure and improve technology to provide modern and sustainable energy services for all in developing countries, in particular the least developed countries, small island developing States and landlocked developing countries, consistent with their national energy policies and strategies, in a manner consistent with their national energy policies and strategies, and in a manner consistent with their national energy policies and strategies. respective support programmes	
8	Promote sustained economic growth, inclusive and sustainable development, full and productive employment and decent work for all	
9	Build resilient infrastructure, promote inclusive and sustainable industrialisation, and fostering innovation	
10	Reducing inequality within and between countries they	
11	Making cities and settlements inclusive, safe, secure, resilient and sustainable	
12	Ensure modalities of consumption and production patterns	
13	Taking urgent action to combat climate change and its effects	*All technical assistance should indicate the relevance to Objective 13 and at least one of the following targets* *(from 13.1 to 13.b).*
	13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	The TA supports the implementation of the national drought plan that seeks, through climate predictability, to have tools for decision making for adequate attention. to episodes of drought.
	13.2 Mainstream climate change measures into national policies, strategies and plans	The TA seeks to provide information for the planning of concrete actions for the attention of potential drought events
	13.3 Improve education, awareness and human and institutional capacity f o r climate change mitigation, adaptation, mitigation and adaptation to climate change, as well as the reduction of its impacts, and early warning	The TA will provide the population with information on relevant actions to be taken in the event of a potential drought episode.

	13.a Fulfil the commitment of developed country parties to the United Nations Framework Convention on Climate Change to achieve by 2020 the goal of jointly mobilizing $100 billion per year from all sources tomeet the needs of developing countries for concrete mitigation actions and transparency of their implementation, and to make the Green Climate Fund fully operational. Climate by capitalising on it as soon as possible	
	13.b Promote mechanisms to build capacity for effective climate change planning and management in the least developed countries and small island developing States, with particular emphasis on women, youth, women and youth and local and marginalised communities	The TA will provide the population with information on relevant actions tobe taken in the event of a potential drought episode.
14	Preserve y use sustainably the oceans, seas and marine resources for sustainable development	
15	Protect, restore and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt the loss of biodiversity	
16	Promoting peaceful and inclusive societies for sustainable development, facilitating access to justice for all and building effective and inclusive institutions at all levels that are accountable	
17	Strengthen the means of implementation and revitalise the Global Partnership for Sustainable Development.	

13. Classification of technical assistance:

Indicate the main type of technical assistance. Optional: if desired, indicate also the secondary type.

Tick the relevant boxes	*Main*	*Secondary*
☐ 1. Decision-making tools and/or the provision of information	X	☐
☐ 2. Designing roadmaps or specific strategies for the sector	☐	X
☐ 3. Recommendations for the reform of laws, policies and regulations	☐	X
☐ 4. Facilitation of financing	☐	X
☐ 5. Private sector participation and market creation	☐	☐
☐ 6. Research and development of new technologies	☐	☐
☐ 7. Feasibility studies on technology options	x	☐
☐ 8. Testing and deployment of known technologies in local conditions	☐	☐
☐ 9. Technology identification and prioritisation	X	☐

Bear in mind that all CTCN technical assistance contributes to strengthening the capacity of the country's actors.

14. Monitoring and evaluation process

Once the implementing partners have been contracted to implement this response plan, the lead implementer will develop a technical assistance monitoring and evaluation plan. This plan should include specific, measurable, feasible, relevant and time-bound indicators to be used to monitor and evaluate the timeliness and adequacy of implementation. The CTCN Technology Manager responsible for the technical assistance will monitor the timeliness and adequacy of theimplementation of the response plan. Upon completion of all activities and outputs, the following evaluation forms will be completed: (i) the NDT will evaluate the overall level of satisfaction with the technical assistance service provided; (ii) the lead implementer will evaluate the experience and knowledge gained through the provision of technical assistance; and (iii) the CTCN manager will evaluate the timeliness and appropriateness of t h e activities and outputs.