

Concept Note

Establishing an Integrated Hydro-Meteorological Early Warning System to Strengthen Climate Resilience in Mozambique

Mozambique | AfDB

7 January 2020



**GREEN
CLIMATE
FUND**

Simplified Approval Process Concept Note

Project/Programme title:	Establishing an Integrated Hydro-Meteorological Early Warning System to Strengthen Climate Resilience in Mozambique
Country(ies):	Mozambique
National Designated Authority(ies) (NDA):	Ministry of Economy and Finance - National Directorate for Monitoring and Evaluation
Executing Entities:	National Institute of Meteorology (INAM), National Directorate for Water Resources Management (DNGRH) and Eduardo Mondlane University (UEM)
Accredited Entity(ies) (AE):	African Development Bank
Date of first submission/ version number:	1/7/2020 6 V.1
Date of current submission/ version number	1/7/2020 6 V.1



Eligibility for SAP is determined by the review of the concept note and the ESS screening.

A. Project / Programme Information (max. 1 page)

A.1. Project or programme	<input checked="" type="checkbox"/> Project <input type="checkbox"/> Programme	A.2. Public or private sector	<input checked="" type="checkbox"/> Public sector <input type="checkbox"/> Private sector	A.3 RFP	Not applicable
A.4. Indicate the result areas for the project/programme	<p><u>Mitigation:</u> Reduced emissions from:</p> <input type="checkbox"/> Energy access and power generation: 0% <input type="checkbox"/> Low emission transport: 0% <input type="checkbox"/> Buildings, cities and industries and appliances: 0% <input type="checkbox"/> Forestry and land use: 0%				
A.5. Impact potential		A.5.1. Estimated mitigation impact (tCO ₂ eq over project lifespan)			
		A.5.2. Estimated adaptation impact (number of direct beneficiaries)	17,800,000 direct beneficiaries		
		A.5.3. Estimated adaptation impact (number of indirect beneficiaries)	11,870,000 indirect beneficiaries		
		A.5.4. Estimated adaptation impact (% of total population)	60% of the country's total population		
A.6. Financing information					
A.6.1. Indicative GCF funding requested (max 10M)	Amount: 8,000,000 Currency: USD Financial Instrument: Grants				
A.6.2. Indicative co-financing	Amount: 3,000,000 Currency: USD Financial Instrument: Grants Institution: AFDB				
A.6.3. Indicative total project cost (GCF + co-finance)	Amount: 11,000,000 Currency: USD				
A.6. Estimated duration of project/ programme:	disbursement period: 36 repayment period, if applicable:	A.7.2. Estimated project/ Programme lifespan	36		
A.8. Is funding from the Project Preparation Facility needed?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	A.9. Is the Environmental and Social Safeguards Category C or I-3?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
A.10. Provide rationale for the ESS categorization (100 words)	This is a project aiming at implementing activities with minimal or no adverse environmental or social risks and/or impacts. It mostly focuses on creating institutional and human capacity to generate adequate, timely and effective weather warnings.				
A.11. Has the CN been	<input checked="" type="checkbox"/> Yes	A.12. Confidentiality	<input type="checkbox"/> Confidential		

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shared with the NDA?	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Not confidential
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A.13. Project/Programme rationale, objectives and approach of programme/project (max 100 words)

Despite large efforts in generating timely and accurate warnings for severe weather by the Meteorological Services and the National Directorate for Water Resources Management, the loss of life and means of subsistence caused by extreme events is still considerable. This is because at present, neither the Meteorological and Hydrological agencies in Mozambique, which are two separate institutions both with limited technical capabilities, work very closely together nor have access to common tools and procedures for generating, storing and sharing relevant data and products. Consequently, there is a proliferation of warning systems, which disrupts current efforts in conveying consistent and effective information to the end-users. In the interest of the social and economic welfare of the country and its people, these processes need to be harmonized and standard operational procedures with clear definition of roles and responsibilities need to be adopted. This project recommends the establishment of an Integrated Hydro-Meteorological Early Warning System by creation of a virtual platform in the form of a 'Hydro-meteorological Forecasting Centre'.

This work will improve weather and water resources monitoring and, thus, issue accurate and integrated warnings in a timely and effective manner, which, in turn, will enable better communication of weather information and warnings from the national level to the grassroots to provide important information for climate adaptation actions and, therefore, strengthen climate resilience in Mozambique. It will also support much better cooperation between departments. Similar models have successfully been implemented by some meteorological and hydrological services in various parts of the world and have resulted in improved disaster response and more effective use of hazard risk in planning and decision-making.

B. Project / Programme details

B.1. Context and Baseline (500 words)

Describe as relevant the climate vulnerabilities and impacts, GHG emissions profile, and mitigation and adaptation needs that the prospective intervention is envisaged to address.

Mozambique is vulnerable to the impacts of extreme weather, water, and climate events. On average, droughts impact livelihoods of people every 3 to 4 years. Downstream to 9 of the 15 major river basins in Southern Africa, Mozambique experiences floods of varying magnitudes every year. With a coastline of 2700 km in the South West Indian Ocean, the country is in the path of tropical cyclones formed in or that cross the western part of Indian Ocean basin. On average, one tropical storm or tropical cyclone hits the coast every 2 years and these are increasing in severity. It is imperative that the national agencies and research units in Mozambique, namely, National Institute of Meteorology (INAM), National Directorate for Water Resources Management (DNGRH) and Eduardo Mondlane University (UEM), are in a position to generate and gather vital information from local level through regional forecasting and hydrological agencies offices. This information can then be stored, and processed to generate more accurate information on the impact of weather and climate events on the waterways and coastlines of Mozambique and will better inform climate research programmes to help decision makers understand future climate impacts on livelihoods in Mozambique and how to

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better prepare for these impacts. This, in turn, will help reduce loss of lives and livelihoods.

According with the recent WMO mission report following Tropical Cyclone IDAI[1], currently there is a need to enhance the capacities of INAM in the following areas: observations; hazard risk assessment; detection, monitoring, analysis and forecasting of hazards and their possible consequences; dissemination of warnings and associated information on potential impacts in a timely and targeted manner; and to engage in public education and awareness about hazards. Similarly DNGRH needs investment for interventions to enhance resilience to floods. Therefore, appropriate prevention and risk management strategies need to be evaluated to reflect a variety of structural and non-structural measures to ensure risk exposure is assessed basin-wide. Integrated Flood Management approaches should be adopted across the country and incorporate the potential future impacts of climate change. A specific emphasis should be on non-structural measures aligned with the different contexts of focus region so that they are meaningful and targeted to audience's needs.

[1] <https://public.wmo.int/en/resources/library/reducing-vulnerability-extreme-hydro-meteorological-hazards-mozambique-after>

INAM, DNRGH and UEM currently are working together, mostly on an *ad hoc* basis in the eminence of an emergency, in an effort to advise decisions makers and the public in advance of severe weather and climate events (storms, floods and droughts). Provision of a virtual platform institutions for Forecasters and Hydrologists to work together to provide flood forecasts in a timely and accurate manner to the disaster risk management agency is a critical requirement in order to improve the lead times for people to prepare for such events. A virtual platform to support data (historical) and modeling capability (in real time) will further support improved coordination across disaster risk management agencies. UEM would also be able to input into this platform with their climate data and interpretations of data for seasonal to longer timescale climate knowledge.

This work will help Mozambique to prepare NOW for the impacts of climate change in future, essential work for increased climate resilience across the nation.

Please indicate how the project fits in with the country's national priorities, action plans and programs and its full ownership of the concept.

Aware of the country vulnerability and the impact of the disasters, the Government of Mozambique has defined Disaster Risk Reduction as one of the National Priorities. Thus, since the year 1999, the following mechanisms were developed / adopted:

- 1999 - Establishment of the Disaster Management Policy (Resolution 18/99);
- 2004 - Establishment of an Early Warning System in place that includes Flood and Cyclone Warning Systems;
- 2006 - Establishment of the National Emergency Operational Center, calling for stronger coordination of government officials & civil defense;
- 2006 - Approval of the Master Plan for Prevention and Mitigation of Natural Disasters (2006 - 2016);
- 2007 - Approval of the National Adaptation Programme of Action for Mozambique (NAPA);
- 2014 - Adoption of the Law 15/2014, establishing the legal regime for disaster management;
- 2015 - Approval of 5 Year Government Plan (PDQ), that specially highlights the need to strengthen Early Warning Systems in order to increase resilience and reduce risk of disasters.
- 2017 - Master Plan for Disaster Risk Reduction in Mozambique for the period 2017-2030.

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All of these plans and systems have been established in order to provide guidance to national technical agencies and ministries of how to implement disaster risk management and climate adaptation processes. Our project aims to simplify and coordinate national priorities across disaster risk management and climate adaptation, recognizing the need for weather, water and climate technical agencies to understand how their work can support the work of agencies involved in disaster risk management. This objective aligns with the Risk Informed Early Action Partnership which has been formed to deliver ACTION at the Climate Action Summit

<https://www.gov.uk/government/news/global-leaders-convened-towards-an-ambitious-climate-action>

This objective also supports the World Meteorological Organization's new strategy, which recognizes the need for weather, water and climate agencies to strengthen collaboration for improved early warnings across all timescales from 1 day to 10 years ahead.

https://www.wmo.int/pages/about/documents/Decision65_EC-69_PreparationofWMOStrategicPlan2020-2023.pdf

Finally, to ensure sustainability and institutionalization of the actions under this project Standard Operation Procedures and Mandates will be reviewed or developed to ensure clarity on roles and responsibilities under this new weather, water and climate partnership.

INAM's value chain begins with observation of weather and climate, followed by data analysis and forecasting, development of specific products / outputs, dissemination and communication of results, interpretation by end users and application and decision making to achieve expected benefit as a result. INAM has a responsibility to issue National Meteorological and Climatological Bulletins and Warnings to several users around the country .

The DNGRH is responsible for formulation of laws and policies related to the water resources. Also it is responsible for hydro climatological data collection and management through the Regional Water Administrations (ARAs). There are five regional water administrations, namely ARA Sul, ARA Centro, ARA Centro-Norte, ARA Zambeze and ARA Norte, both are responsible for operation of hydrometric network at regional level. The hydro climatologically data collected by ARAs are sent to national database at DNGRH. During rainy season the frequency of data collection and transmission increase to allow close monitoring of the statues of the river basin. The DNGRH has a responsibility to issue national Hydrological Bulletin daily to several users and hydrological warnings' once necessary.

The UEM is the largest and oldest public University in Mozambique, which, by statutory mandate, has the responsibility of promoting and encouraging scientific research and studying the applications of science and technology in the country development priorities and the dissemination of its results among stakeholders to allow for science based decision making. It is the only University with an undergraduate course in Meteorology and an Msc in Disaster Risk Management and Adaptation to Climate Change. It is under these courses that state-of-the-art concepts such as Multi-Hazard Impact Based Forecast are taught, tested and tailored to the national context. In addition, MSc programmes in Water Resources Management and Geohydrology are added to the offer menu of UEM. This university has a long lasting relationship with INAM through an MoU signed years ago, focusing capacity building and joint research project proposals and implementation. In this project, among others activities, UEM will help with research on hazard risk assessments, weather/climate risk

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assessment, vulnerability and exposure assessments to help people understand future impacts of hazards, weather and climate on livelihoods and long term development

Describe the main root causes and barriers (social, gender, fiscal, regulatory, technological, financial, ecological, institutional, etc.) that need to be addressed. Where relevant, please describe the key characteristics and dynamics of the sector or market.

Various efforts on disaster risk management, including an early warning system for hydro-meteorological hazards have been pursued in Mozambique. However, there are gaps and limitations related to the accuracy, timeliness and uptake of the warning messages. Decision makers do not have decision support tools and communities need to enhance education and awareness to understand the risks associated with the hazard in order to take appropriate action. Also, decision makers need tools for flood plain mapping, land use and land planning to avoid occupation of inappropriate areas. Currently there are different warning systems for meteorological and hydrological hazards, mainly because in the country, the Hydrological and Meteorological Services are two distinct institutions, lacking appropriate mechanisms and tools for effective operational and institutional coordination.

It is imperative INAM and DNRGH - through the regional offices and ARAs - establish clear early action protocols, which can inform the disaster risk management agency in advance of a severe weather or climate event. For example, the National Institute for Disaster Management (INGC) currently requires INAM to issue a red alert well in advance of landfall of a Tropical Cyclone (as experienced before TC IDAI hit the coastline) in order for the Government to release preparedness funds to INGC. However, a red alert in meteorological terms is only usually issued when the community must 'take action' and would therefore lose its imperative if used too far in advance of the weather event.

There is much work to be done to improve on the current Standard Operating Procedures in order to find the best way forward for early warnings in Mozambique. We will be working with expert technical agencies to develop Impact Based Forecasts and Risk Based Warnings, which will help people, understand what the weather will DO as opposed to what the weather will BE. This moves us away from data provision towards tailored weather, water and climate services, which are understandable and usable.

To address social barriers in the country in terms of how vulnerable women, children and disabled groups receive weather and climate information, we will ensure we continue to engage with INGC and other community level organisations to ensure we understand what forms of communication are most useful to these communities. There is also need to engage social scientists to provide insight about the incentives and barriers for the use of weather-, water-, and climate services and how hazards related weather-, water-, and climate services impact differently various groups

The data and information provided through the virtual platform will help UEM to understand and address key areas of concern for the environment: working with the Ministry of Public Works, Housing and Water Resources (MOPHRH) to address the impact of climate variability on infrastructure - like drainage systems and also to inform on the risks of de-forestation in increasing CO2 emissions and destroying livelihoods in the fishing communities; UEM's social scientists will work more effectively with

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vulnerable communities on various aspects of warning understanding and communication. INAM is currently digitising climate data, while DNRGH is also in the process of digesting their water data. This which will be essential in providing historical information to support research towards the establishment of an effective Early Warning System in Mozambique.

On the other hand, another high-level beneficiary of the proposed “one-stop shop” data and information platform is the health Sector. The Ministry of Health has just conducted the climate Vulnerability and Adaptation Assessment (V&A) of the Health Sector in Mozambique, which highlighted climate data and information sharing concerns. By systematically providing timely and georeferenced data, this project will respond to major aspects of the Early Warning component of the Health Adaptation Plan (HNAP), especially for the climate sensitive diseases, such as malaria and acute diarrhoea, including cholera - the major causes of death in Mozambique, and therefore allow the sector to adapt and strengthen its resilience to climate.

By bringing together the data from water and climate agencies into one shared platform it will also be possible to start research on the financial benefits of improving climate resilience in Mozambique. Weather, water and climate knowledge is essential to understanding the future impacts of climate change on Mozambique and, at present, there is a clear risk to agriculture, livestock and cash crops in Mozambique by increasing temperatures and reduced rainfall (already experienced and increasing in frequency).

If our partnership, as a result of working more closely together, is able to better inform the government on where in the country there will be more floods or reduced rainfall then this vital information can be acted on through adaptation policies NOW to help mitigate the impacts of weather, water and climate on people.

B.2. Project / Programme description (1000 words)

Describe the expected set of components and activities to address the above barriers identified that will lead to the expected outcomes.

Establishment of an integrated Hydro-Meteorological system will lead to better communication, coordination, data and information sharing between INAM, DNRGH, ARAs, UEM, INGC, Agriculture, Health, Decision Makers and other institutions dealing with climate data/information and disaster management within the country. In addition, operational capacity gaps currently faced by the meteorological and hydrological services will be bridged through the project. In order to achieve this objective, the following activities will be undertaken in the project:

- I. Development and testing of methodologies and Standard Operating Procedures (SOPs) to improve interaction between Meteorological and Hydrological Services;
- II. Establishing SOPs to ensure consistency of operations, data and information exchange, clear roles and responsibilities among the meteorological and hydrological services, national institute of disaster risk management and other relevant institutions;
- III. Procurement of a system (High Performance Computing -HPC) for processing and analysis of meteorological data and forecasting; Procurement of an integrated operational system (Platform) for sharing of hydro-meteorological forecast/products/information and disseminate in real

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time common national multi-hazard early warnings. The system will likely be hosted at a provider of cloud services

IV. Development of methodologies and systems to establish and secure an Internet connectivity and bandwidth specifically for the platform system at INAM, DNGRH and INGC.

V. Conduct technical and institutional capacity building on using methodologies and tools to improve meteorological and hydrological forecasts including flood warnings and implementation of Impact Based Forecasts and multi-hazard Risk Based Warnings for both INAM and DNGRH.

VI. Conduct research on the four elements of an effective early warning system, focusing on social aspects, such as effective communication of warnings to those at risk.

VII. Development of SOPs for the communication of alerts, watches and early warning messages from the meteorological and hydrological services to INGC, potential stakeholders and thereof to communities;

VIII. Development of a dynamical integrated risk assessment SOPs and tools for floods, droughts and cyclones;

IX. Development of a dynamic and interactive Atlas of Weather, Water, and Climate Risk for the country, to serve as a reference for risk knowledge in Mozambique

X. Development of ToRs to establish a task team of experts from regional and global meteorological, hydrological and IT companies to ensure coordinated delivery of the project objectives, answerable to the National Water, Weather and Climate Partnership (made up of INAM, DNGRH, UEM and INGC - the latter as users of this information);

XI. Development of educational programs, awareness material and conduct trainings for communities at risk

XII. Undertake consultancy services (Experts to help design the TOR/Ts and other eventual needs of the project)

XIII. Expansion and modernization of the national observation network

XIV. Contingency activities

Please explain why this project or programme is ready for scaling up and has the potential for transformation. Has it been piloted in the country or region

Disaster risk reduction is a country priority. By generating risk assessments and implementing an integrated multi-hazard early warning system hinged on impact based forecasts and risk based warnings, decision makers and communities will be provided with actionable information for enhanced

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preparedness and response. Risk assessment information will inform land use management, construction codes for infrastructure development and education and awareness. These elements will support a more proactive and sustainable risk management which will result in more resilient communities and development.

Since 2018 INAM has been working on projects to modernize and improve meteorological services, supported by the Nordic Development Fund (NDF) and aligned to the Transforming Hydro-Meteorological Services Project, which is financed by the World Bank Pilot Program for Climate Resilience (PPCR). This project, which will end in December 2019, is enabling INAM and DNGRH to increase its skill and expertise to develop services and pilot an early-warning severe weather scheme.

This project proposal seeks to respond to the recommendations issued in the recent WMO mission report following Tropical Cyclone IDAI[1]. This report indicates the need for better coordination across water, weather and climate agencies and to develop services, which support triggers of preparedness financing and activities through INGC and local civil contingency agencies. The report also recommends a number of capacity building activities to be undertaken.

The project will greatly explore further the concepts of an integrated flood forecasting platform, which will build on existing platforms used in DNRGH and bring together data from INAM and DNRGH into one, easy to navigate, application. At present we have been advised on a project called SAGA-EO[2], that took place in five African countries including Mozambique which might support this endeavor however we will of course ensure we find the right solution for all 3 agencies involved in the project.

Are the proposed interventions well documented for their costs and benefits?

Yes, the proposed interventions are well documented for their costs and objectives.

Describe in what way the Accredited Entity(ies) is well placed to undertake the planned activities and what the implementation arrangements with the executing entity(ies) and implementing partners will be.

The African Development Bank is accredited to the Green Climate Fund and has been managing climate programmes in region for decades. AFDB have mobilised approximately \$12billion of climate finance in region to support climate resilience and low carbon development in Africa. AFDB recognise the value in supporting Hydromet Development programmes and work closely with the World Bank, DFID and other funders to ensure value for money on their programmes.

The Bank's Action Plan on Climate Change emphasizes the need to increase support for capacity building to tackle climate risks and meets the requirements of the second pillar of the CSP 2018-2022, through the envisaged increased agriculture productivity as a result of the improved water and land management activities. It will bring "climate smart" agriculture production systems and promote actions for the enhancement of resilience of infrastructures by restoring degraded ecosystems, improving living conditions, integrating climate information into agriculture activities and integrated management of infrastructure.

In order to build a more resilient and sustainable national disaster risk management system, the

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AFDB has been making significant investments in institutional strengthening and dissemination of best practices and experiences at the global and continental levels, providing technical assistance and knowledge building.

The Bank will support this project, which sets out to establish an integrated hydro-meteorological forecast, rebuild the previous warning system and strengthen the general forecasting capacity of INAM and DNGRH.

Please provide a brief overview of the key financial and operational risks and any mitigation measures identified.

The logistical and infrastructural challenges in Mozambique present significant operational barriers to dissemination of weather and climate services. By using INAM's region office structure and variety of communication channels we expect to overcome these barriers to a large degree and have increased reach to communicate the information

Please explain how the M&E will be conducted as part of the project or programme (routine and concurrent monitoring, interim and final evaluations, and annual reports)

Baseline survey of the access, understanding and use of weather and climate services followed by further surveys through the program to assess the increases in reach. Training courses will be run with a selection of stakeholders to improve understanding, which will include metrics that capture the increase of knowledge. The focus on Impact based forecasts will assess how users put the information into early action to help mitigate climate change and high impact weather events. These improvements will be captured in quarterly reports and a final report will also address practical implementation of Impact based forecasts and the relationship to Forecast based Financing for Disaster Risk Reduction agencies.

The final report will also include qualitative surveys of the 'Flood Forecasting Centre' stakeholder to assess the perceived overall impact of the cooperation and improved communications.

[1] <https://public.wmo.int/en/resources/library/reducing-vulnerability-extreme-hydro-meteorological-hazards-mozambique-after>

[2] <https://cordis.europa.eu/project/rcn/95051/factsheet/en>

B.3. Expected project results aligned with the GCF investment criteria (500 words)

Please describe and provide an estimate of the expected impacts aligned with the GCF investment criteria: impact potential, paradigm shift, sustainable development, needs of recipients, country ownership, and efficiency and effectiveness.

- Improvement of inter-institutional operational coordination and communication through revision of standard operating procedures;
- Improvement of hydro-climatic predictions, watershed monitoring and warning systems;
- Increases in reach, understanding and use of weather and climate information by decision-makers and vulnerable communities.
- More effective and coordinated production and dissemination of impact based early warnings;

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- More appropriate actions to prevent loss of human life and material damage in cases of extreme weather events;
- Development of a replicable and up scalable integrated system.

C. Indicative financing / Cost information (max. 2 pages)

C.1. Financing by components

Please provide an estimate of the total cost per component and disaggregate by source of financing.

Component	Output	Indicative cost (USD)	GCF financing		Co-financing			
			Amount (USD)	Financial Instrument	Type	Amount (USD)	Financial Instrument	Name of Institutions
I	Methodologies and SOPs for better communication and coordination between INAM DNGRH developed and tasted.	150,000	150,000	Grant		0	Grant	
II	SOPs to ensure consistency of operations, data and information exchange, clear roles and responsibilities established.	300,000	300,000	Grant		0	Grant	
III	HPC and Platform systems acquired, installed and operational.	3,800,000	1,800,000	Grant	Public	2,000,000	Grant	AfDB
IV	Internet connectivity and bandwidth improved	150,000	150,000	Grant		0	Grant	
V	Technical and institutional capacities in SOPs	500,000	500,000	Grant		0	Grant	

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	and meteorological and hydrological forecast created.							
VI	Research on the four elements of an effective early warning system conducted.	350,000	350,000	Grant		0	Grant	
VII	SOPs for alerts and early warning dissemination developed.	300,000	300,000	Grant		0	Grant	
VIII	Dynamic Integrated risk assessment tools for floods, droughts and cyclones developed.	1,500,000	1,500,000	Grant		0	Grant	
IX	Atlas of Weather, Water, and Climate Risk for the country developed.	350,000	350,000	Grant		0	Grant	
X	ToRs for task team of experts from regional and global meteorological, hydrological and IT companies for better among key actors developed.	200,000	200,000	Grant		0	Grant	
XI	Educational programs	150,000	150,000	Grant		0	Grant	

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	and awareness material developed.							
XII	Consulting services carried out.	250,000	250,000	Grant		0	Grant	
XIII	Observation Network expanded at district level	2,000,000	1,000,000	Grant		1,000,000	Grant	AfDB
XIV	Contingency expenses covered.	1,000,000	1,000,000	Grant		0	Grant	
Indicative total cost (USD)		11,000,000	8,000,000			3,000,000		

For private sector proposal, provide an overview (diagram) of the proposed financing structure.

C.2. Justification of GCF Funding Request (300 words)

As stated in the outset, Mozambique is one of the most vulnerable countries worldwide to climate events, climate extremes, including droughts, floods, and tropical cyclones of the magnitude of various kinds. Because of the geographic vulnerability and the lack of effective multi-hazard early warning systems, exacerbated by current economic distress, climate risks represent additional burden to the already stressed national budget. The government recognised the priority climate risks represent and, thus, established, in 2018, a Calamity Management Fund. The support currently provided by donors in case of emergencies to this fund is highly acknowledged by the government. However, for the reasons stated above, it appears these funds are mostly activated for response and rarely for preparedness. Under the current circumstances, as the budget allocated to the funds is low, the expenditure thereof unforeseeable, the delays in disbursement aggravate the levels of emergencies and these funds are never enough for response and recovery, as was recently seen for the cases of Cyclones Idai and Kenneth.

It is under these circumstances that GCF funding is requested to support the establishment and improved multi-hazard early warning system which will allow for proper planning and disaster risk management, thus reducing public expenditure and increasing both institutional and human capacity.

C.3. Exit Strategy and Sustainability (300 words)

This is a once-off investment, the activities of which will be mainstreamed in the national budget plan of the country's fast growing economy. Because of the subsequent low cost of the activities, supported by institutional capacity enhancements that will be in place, backed by local researchers that will improve the multi-hazard early warning system to be established and the government commitment to ensure this topic is priority by issuing appropriate policies, laws and regulations, the likelihood of success is large. The government has its own monitoring mechanisms in place for its own plans, including the contingency emergency response plans. Thus, these will be used to monitor the programmes activities once they are incorporated in the national plans.

C.4 Stakeholders engagement in the project or programme (300 words)

This programme was co-produced by INAM, DNGRH and UEM to reflect each stakeholder's objectives and expectations within the programme. Several meetings and discussions took place so

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far which resulted in this concept. The proponents briefed the NDA about this programme and the NDA had also the opportunity to present it at the “Marketplace: Livelihoods - Climate Information and Early Warning Systems”, held 21 August 2019 in Seoul. Systematic meetings with relevant stakeholders are planned as they are identified till the funding stage. The NDA will be kept informed on the steps taken and their advice will be sought after in all stages.

D. Annexes

- ESS screening check list (Annex 1)
- Map indicating the location of the project/programme (as applicable)
- Evaluation Report of previous project (as applicable)

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Annex 1: Environmental and Social Screening Checklist

Part A: Risk Factors

Please indicate your answers to the questions below and provide an explanation on the response selected. In cases when the TBD response has been selected please explain briefly why you are not able to determine now and when in the project cycle the question will be addressed.

If the criteria is not applicable to the project you may write N/A in the justification box.

Exclusion criteria	YES	NO
Will the activities involve associated facilities and require further due diligence of such associated facilities? .	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Will the activities involve trans-boundary impacts including those that would require further due diligence and notification to affected states? .	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Will the activities adversely affect working conditions and health and safety of workers or potentially employ vulnerable categories of workers including women and children? .	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Will the activities potentially generate hazardous waste and pollutants including pesticides and contaminate lands that would require further studies on management, minimization and control and compliance to the country and applicable international environmental quality standards? .	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Will the activities involve the construction, maintenance, and rehabilitation of critical infrastructure (like dams, water impoundments, coastal and river bank infrastructure) that would require further technical assessment and safety studies? .	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Will the activities potentially involve resettlement and dispossession, land acquisition, and economic displacement of persons and communities? .	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Will the activities be located in or in the vicinity of protected areas and areas of ecological significance including critical habitats, key biodiversity areas and internationally recognized conservation sites? .	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Will the activities affect indigenous peoples that would require further due diligence, free, prior and informed consent (FPIC) and documentation of development plans? .	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Will the activities be located in areas that are considered to have archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values or contains features considered as critical cultural heritage? .	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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Part B: Specific environmental and social risks and impacts

Assessment and Management of Environmental and Social Risks and Impacts	YES	NO	TBD
Has the E&S risk category of the project been provided in the concept note?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Has the rationale for the categorization of the project been provided in the relevant sections of the concept note?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Are there any additional environmental, health and safety requirements under the national laws and regulations and relevant international treaties and agreements?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Are the identification of risks and impacts based on recent or up-to-date information?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
.			
Labour and Working Conditions	YES	NO	TBD
Will the activities potentially have impacts on the working conditions, particularly the terms of employment, worker's organization, non-discrimination, equal opportunity, child labour, and forced labour of direct, contracted and third-party workers?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Will the activities pose occupational health and safety risks to workers including supply chain workers?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Resource Efficiency and Pollution Prevention	YES	NO	TBD
Will the activities generate (1) emissions to air; (2) discharges to water; (3) activity-related greenhouse gas (GHG) emissions, (4) noise and vibration; and (5) wastes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Will the activities utilize significant amount of natural resources including water and energy?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Will there be a need to develop detailed measures to reduce pollution and promote sustainable use of resources?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Community Health, Safety, and Security	YES	NO	TBD
Will the activities potentially generate risks and impacts to the health and safety of the affected communities?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Will there be a need for an emergency preparedness	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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and response plan that also outlines how the affected communities will be assisted in times of emergency?			
.			
Will there be risks posed by the security arrangements and potential conflicts at the project site to the workers and affected community?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Land Acquisition and Involuntary Resettlement	YES	NO	TBD
Will the activities likely involve land acquisition and/or physical or economic displacement?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Biodiversity Conservation and Sustainable Management of Living Natural Resources	YES	NO	TBD
Will the activities potentially introduce invasive alien species of flora and fauna affecting the biodiversity of the area?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Will the activities have potential impacts on or be dependent on ecosystem services including production of living natural resources (eg. agriculture, animal husbandry, fisheries, forestry)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Indigenous Peoples	YES	NO	TBD
Will the activities potentially have any indirect impacts on indigenous peoples, ethnic minorities, or vulnerable and marginalized groups?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Cultural Heritage	YES	NO	TBD
Will the activities restrict access to the cultural heritage sites and properties?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Will there be a need to prepare a chance-find procedure in case of the discovery of cultural heritage assets?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			
Stakeholder engagement and grievance redress	Yes	NO	TBD
Will the activities include a continuing stakeholder engagement process and a grievance redress mechanism and integrated into the management/implementation plans?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
.			

Part C: Sign Off

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Sign-off: *Specify the name and designation of the person responsible for the environmental and social screening and any other approvals as may be required in the accredited entity's own management system.*

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