

# Concept Note

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## **Enhancing Early Warning Systems to build greater resilience to hydro and meteorological hazards in Timor-Leste**

Timor-Leste | UNEP

5 September 2019



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# Concept Note

Project/Programme Title:	Enhancing Early Warning Systems to build greater resilience to hydro and meteorological hazards in Timor-Leste
Country(ies):	Timor-Leste
National Designated Authority(ies) (NDA):	Dr. Julião dos Reis Acting Executive Secretary Timor-Leste Green Climate Fund National Designated Authority and Principal Adviser for Climate Finance and Resource Mobilization
Accredited Entity(ies) (AE):	<u>United Nations Environment Programme</u>
Date of first submission/ version number:	<u>2019-09-05 (v1)</u>
Date of current submission/ version number:	<u>2019-09-05 (v1)</u>



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## Notes

- The maximum number of pages should **not exceed 12 pages**, excluding annexes. Proposals exceeding the prescribed length will not be assessed within the indicative service standard time of 30 days.
- As per the Information Disclosure Policy, the concept note, and additional documents provided to the Secretariat can be disclosed unless marked by the Accredited Entity(ies) (or NDAs) as confidential.
- The relevant National Designated Authority(ies) will be informed by the Secretariat of the concept note upon receipt.
- NDA can also submit the concept note directly with or without an identified accredited entity at this stage. In this case, they can leave blank the section related to the accredited entity. The Secretariat will inform the accredited entity(ies) nominated by the NDA, if any.
- Accredited Entities and/or NDAs are encouraged to submit a Concept Note before making a request for project preparation support from the Project Preparation Facility (PPF).
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<b>A. Project/Programme Summary (max. 1 page)</b>			
<b>A.1. Project or programme</b>	<input checked="" type="checkbox"/> Project <input type="checkbox"/> Programme	<b>A.2. Public or private sector</b>	<input checked="" type="checkbox"/> Public sector <input type="checkbox"/> Private sector
<b>A.3. Is the CN submitted in response to an RFP?</b>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, specify the RFP: _____	<b>A.4. Confidentiality<sup>1</sup></b>	<input type="checkbox"/> Confidential <input checked="" type="checkbox"/> Not confidential
<b>A.5. Indicate the result areas for the project/programme</b>	<p><u>Mitigation:</u> Reduced emissions from:</p> <input type="checkbox"/> Energy access and power generation <input type="checkbox"/> Low emission transport <input type="checkbox"/> Buildings, cities and industries and appliances <input type="checkbox"/> Forestry and land use <p><u>Adaptation:</u> Increased resilience of:</p> <input checked="" type="checkbox"/> Most vulnerable people and communities <input checked="" type="checkbox"/> Health and well-being, and food and water security <input type="checkbox"/> Infrastructure and built environment <input type="checkbox"/> Ecosystem and ecosystem services		
<b>A.6. Estimated mitigation impact (tCO<sub>2</sub>e over lifespan)</b>		<b>A.7. Estimated adaptation impact (number of direct beneficiaries and % of population)</b>	Up to 80% of the population (approx. 947,000 people) have experienced climate-related hazards in their lifetime and are therefore potential beneficiaries of this project.
<b>A.8. Indicative total project cost (GCF + co-finance)</b>	Amount: USD 21,000,000	<b>A.9. Indicative GCF funding requested</b>	Amount: USD 19,000,000
<b>A.10. Mark the type of financial instrument requested for the GCF funding</b>	<input checked="" type="checkbox"/> Grant <input type="checkbox"/> Reimbursable grant <input type="checkbox"/> Guarantees <input type="checkbox"/> Equity <input type="checkbox"/> Subordinated loan <input type="checkbox"/> Senior Loan <input type="checkbox"/> Other: specify _____		
<b>A.11. Estimated duration of project/ programme:</b>	5 Years	<b>A.12. Estimated project/ Programme lifespan</b>	10 Years
<b>A.13. Is funding from the Project Preparation Facility requested?<sup>2</sup></b>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Other support received <input type="checkbox"/> If so, by who: PPF funding received through WMO	<b>A.14. ESS category<sup>3</sup></b>	<input type="checkbox"/> A or I-1 <input type="checkbox"/> B or I-2 <input checked="" type="checkbox"/> C or I-3
<b>A.15. Is the CN aligned with your accreditation standard?</b>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	<b>A.16. Has the CN been shared with the NDA?</b>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<b>A.17. AMA signed (if submitted by AE)</b>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If no, specify the status of AMA negotiations and expected date of signing:	<b>A.18. Is the CN included in the Entity Work Programme?</b>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<b>A.19. Project/Programme rationale, objectives and approach of programme/project (max 100 words)</b>	As a Least Developed Country (LDC) and Small Islands Developing State (SIDS) Timor-Leste is highly vulnerable to the effects of climate change and considered to be one of the top 10 countries in the world most at risk to natural disasters. Climate-related hazards such as landslides, flooding and droughts impact the development of Timor-Leste through the disruption of the transportation links, destruction of private houses and public infrastructure including health services centres and increases in food		

<sup>1</sup> Concept notes (or sections of) not marked as confidential may be published in accordance with the Information Disclosure Policy ([Decision B.12/35](#)) and the Review of the Initial Proposal Approval Process ([Decision B.17/18](#)).

<sup>2</sup> See [here](#) for access to project preparation support request template and guidelines

<sup>3</sup> Refer to the Fund's environmental and social safeguards ([Decision B.07/02](#))

	<p>insecurity that further induce negative impacts on the environment and biodiversity. This project will address the urgent need for a comprehensive multi-hazard early warning system (MHEWS) for increasing the resilience of the most vulnerable people and communities of Timor-Leste. Amongst others, the project will establish and improve observation and monitoring infrastructure, impact-based forecasting, accurate and timely warnings to vulnerable communities in order to reduce climate risks. In addition, the project will put in place a strengthened and sustainable framework and business model for national climate services. At the request of the GCF Nationally Designated Authority (NDA) of Timor-Leste, the UN Environment Programme (UNEP) will serve as the accredited entity for the project. The AE will work with a range of partners and executing entities, including Government Entities (namely the Ministry of Development and Institutional Reform), FAO and WMO.</p>
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## B. Project/Programme Information (max. 8 pages)

### B.1. Context and baseline (max. 2 pages)

#### Background

Timor-Leste occupies the eastern half of Timor island and is situated at the eastern end of the Lesser Sunda Islands of the Indonesian archipelago and about 500 km north west of Australia. Timor-Leste lies between latitudes 8°15' and 10°30' south, and longitudes 124°50' and 127°30' east and has an area of approximately 14,954 km<sup>2</sup>.<sup>4</sup> This includes the mainland area of 13,989 km<sup>2</sup>, Oecusse enclave of 817 km<sup>2</sup>, Atauro Island of 140 km<sup>2</sup> and Jaco Island of 8 km<sup>2</sup>. The topography, particularly of the mainland, is hilly and mountainous. There is a sudden increase in the elevation from northern coastal areas to central areas, rising at Mount Ramelau to 2,963 meters. The topography of the island influences its climate (rainfall) and thus agricultural activities.

Timor-Leste has a total population of 1,183,643 people distributed in 13 municipalities (National Census, 2015). The capital city of Dili is the most populous (277,279 people). The municipalities of Aileu and Manatuto are the two least populated in the country, with 48,837 and 46,619 people respectively. Timor-Leste gained independence from Indonesian occupation in 2002. As a new country, the significant challenges faced by Timor-Leste include rapid population growth, high rates of unemployment, depletion of natural resources, food insecurity, poverty, and vulnerability to natural hazards and climate change.<sup>5</sup>

#### Climate change vulnerabilities and impacts

As highlighted in the *attached detailed Climate Rationale (Annex 1)*, Timor-Leste is considered to be one of the top 10 countries most at risk to natural disasters (World Risk Report, 2017)<sup>6</sup>, (INC, 2014)<sup>7</sup>. Around 80% of Timorese have experienced the effects of a natural disaster in their lifetime. The vulnerability of Timor-Leste is high due to a significant lack of institutional and community coping and adapting capacities. For example, the Government of Timor-Leste has categorized 59% of villages as “quite vulnerable”, “vulnerable” or “very vulnerable” to climate change and identified required adaptation actions (Figure 1). Furthermore, climate-related hazards (such as floods and heavy rainfall) have caused over 80% of all disaster-related deaths compared to other disasters such as conflict and accidents, and also resulted in second highest number of houses being destroyed and damaged since 1992.<sup>8</sup>

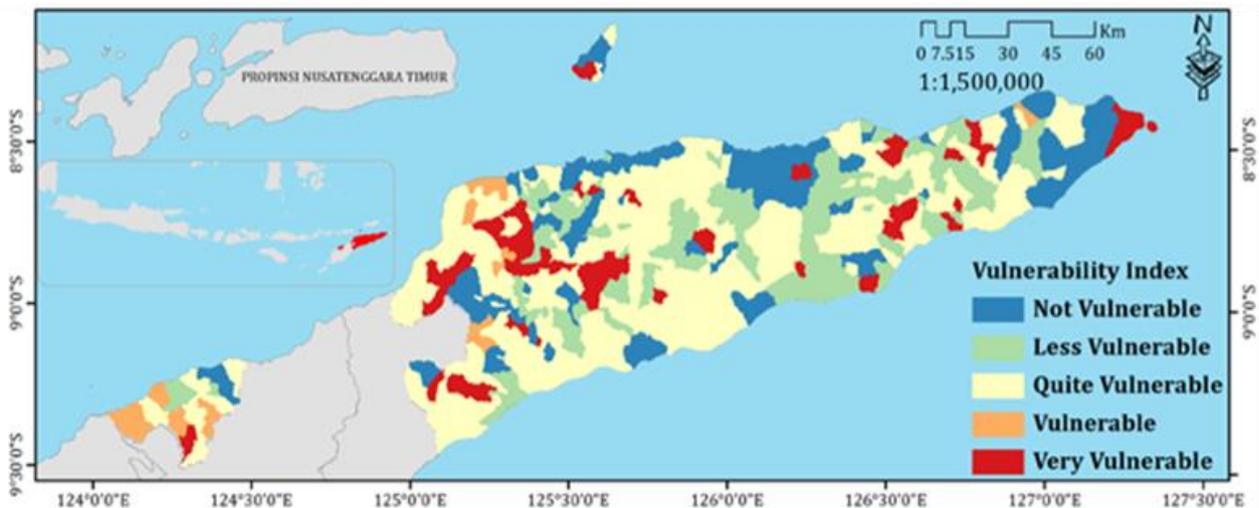


Figure 1. Categorization of villages at Timor-Leste based on the vulnerability index (INC, 2014)

<sup>4</sup> RDTL (2010). Sustainable Development in Timor-Leste. Republica Democratica de Timor-Leste: <https://sustainabledevelopment.un.org/content/documents/978timor.pdf>

<sup>5</sup> Ministry of Economy and Development, Sustainable Development in Timor-Leste: National Report to the United Nations Conference on Sustainable Development, 2012

<sup>6</sup> [https://reliefweb.int/sites/reliefweb.int/files/resources/WRR\\_2017\\_E2.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/WRR_2017_E2.pdf)

<sup>7</sup> Timor-Leste Initial National Communication to the UNFCCC (2014): <https://unfccc.int/resource/docs/napa/tls01.pdf>

<sup>8</sup> <http://www.desinventar.net/DesInventar/profiletab.jsp?countrycode=etm&continue=y>

Approximately 430,000 people in Timor-Leste (36% of the population) are chronically food insecure. Low agricultural productivity and poor quality and quantity of food consumption are key contributing factors. Food insecurity may increase sharply in the event of natural disasters such as during the 2015/16 El Niño incidence. Malnutrition is a major public health concern: 46% of children under 5 years of age suffer from chronic malnutrition (stunting) while 24% suffer from acute malnutrition (wasting).

Timor-Leste has a tropical monsoon climate with two main seasons; the dry season from June to October and the wet season from November/December to May/June.<sup>9</sup> Inter-annual variation in Timor-Leste's climate is significantly influenced by El Niño Southern Oscillation, which changes the timing and volume of rainfall.<sup>10</sup>

Based on historical climate data, annual mean temperature over Timor-Leste has increased consistently at a rate of  $\sim 0.016$  °C per year. By 2030, a temperature increase of 0.3-1.0 °C is predicted. For the high emission scenario (RCP8.5), the increase in temperature relative to current conditions may reach 3 °C by 2100. This would result in more very hot days and increased sea surface temperature. Figure 2 shows mean annual temperatures for 1950 – 2000 and the projection for 2050.

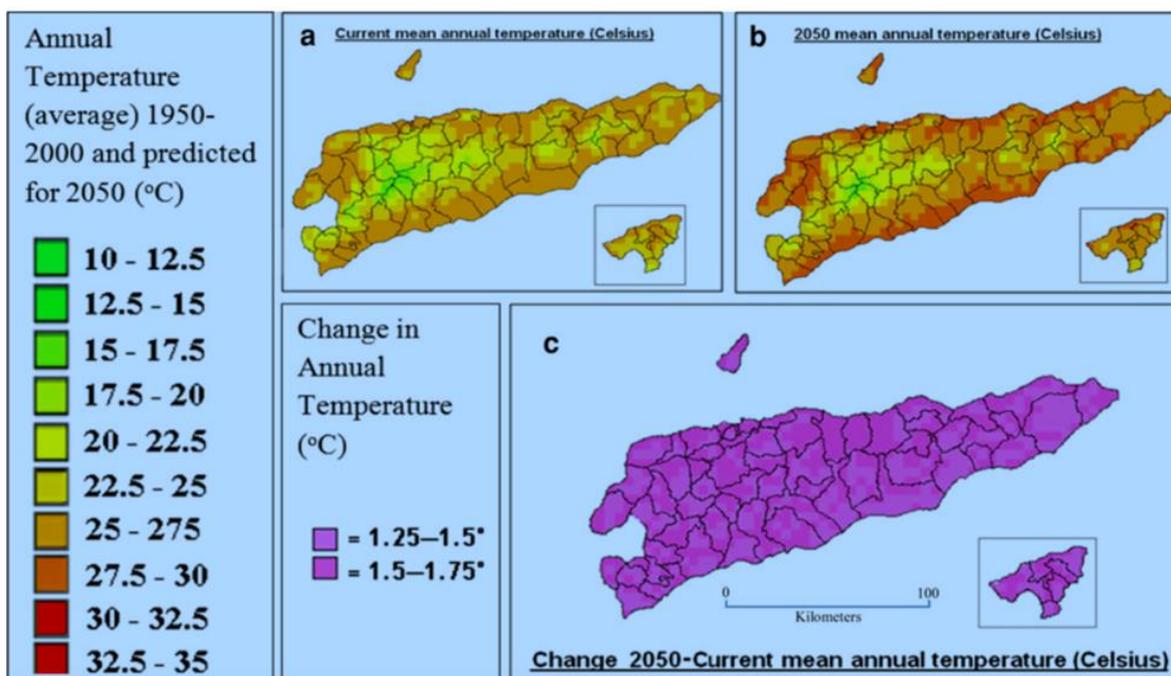


Figure 2. Projection of the temperature for 2050 (Molyneux et al, 2012).<sup>11</sup>

Historically, the sea level surrounding the main island of the country has risen at  $\sim 5.5$  mm/year. Projected sea level rise is 6-15 cm by 2030. Over 100 years, the sea level rise may reach 76 cm. Based on the Pacific Climate Change Science Program (2011), Pacific Ocean acidification has also been increasing in Timor-Leste's waters. It will continue to increase and threaten coral ecosystems.<sup>12</sup>

Variability in rainfall over Timor-Leste is predicted to further increase. Extreme rainfall events are projected to become fewer but more intense as a result of decreasing numbers of tropical cyclones, albeit with stronger intensity (Pacific Climate Change Science Program 2011). Decreases in rainfall are projected in some parts of the country, such as the northern coast, and drought may become more frequent.<sup>13</sup> Figure 3 shows annual rainfall data for 1950 – 2000 and the projection for 2050.

<sup>9</sup> UNDP, BCPR. Climate Risk Management for Agriculture Sector in Timor Leste. 2013.

<sup>10</sup> BMRC. Effect of El Niño on East Timor rainfall. 2003.

<sup>11</sup> Molyneux, N., Da Cruz, G. R., Williams, R. L., Andersen, R., & Turner, N. C. (2012). Climate change and population growth in Timor-Leste: implications for food security. *Ambio*, 41(8), 823-840.

<sup>12</sup> <https://unfccc.int/resource/docs/natc/tlnc1.pdf>

<sup>13</sup> Climate Change in the Pacific: Scientific Assessment and New Research. Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation (2011): <http://www.cawcr.gov.au/projects/PCCSP/>

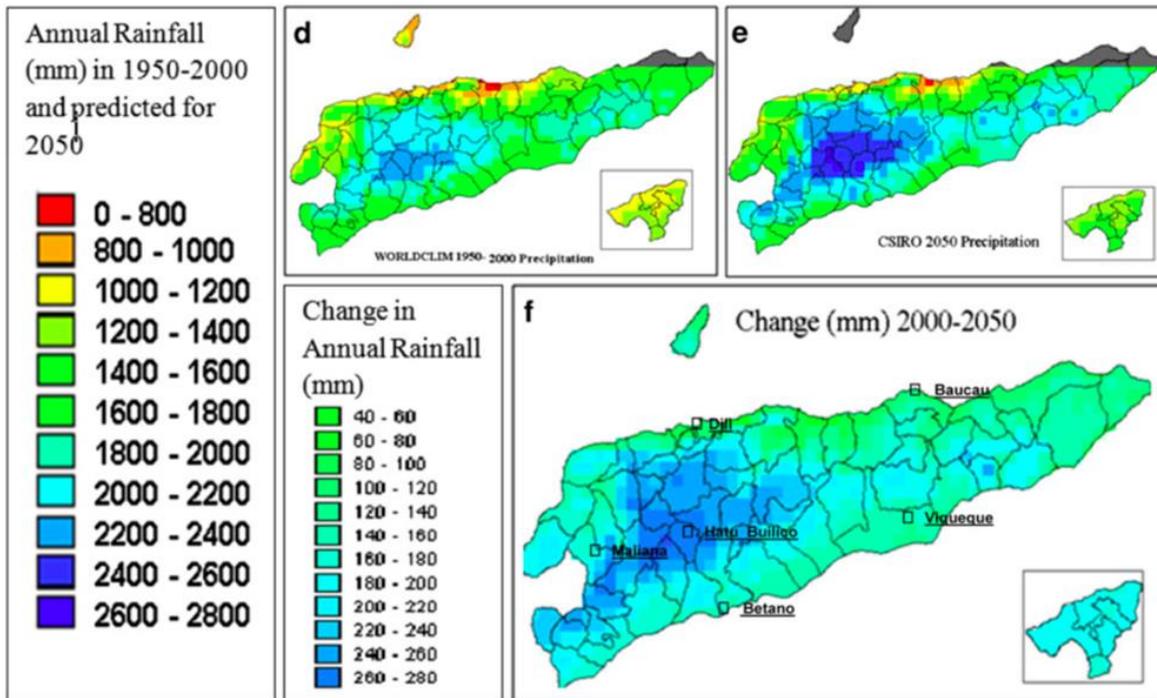


Figure 3. Projection of the annual rainfall for 2050 (Molyneux et al, 2012).<sup>14</sup>

Landslides, floods and drought are the three main climate-related hazards to Timor-Leste. In addition, the Global Facility for Disaster Reduction and Recovery (GFDRR) has classified the wildfire hazard risk to Timor-Leste as high. The occurrence of El Niño and La Niña phenomena (Figure 4), which is normally associated with these extreme climate events, has already resulted in serious damage and disasters affecting various socio-economic sectors of the country.

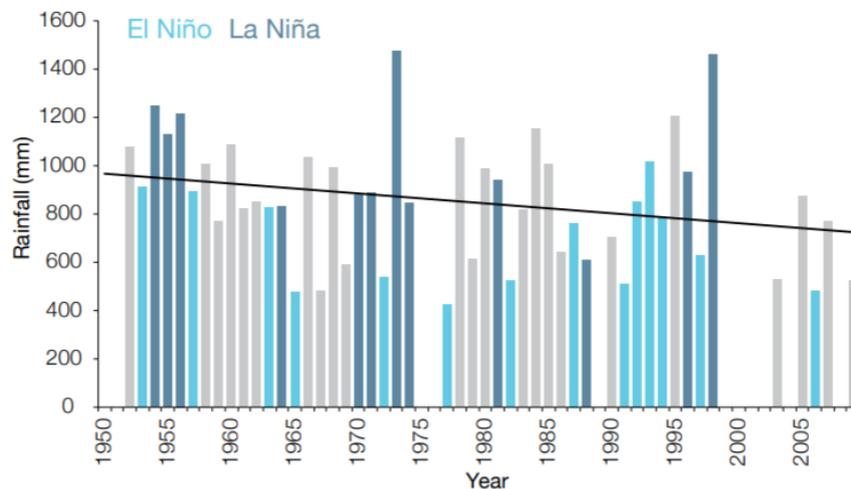


Figure 4. Annual rainfall for Dili Airport. Light blue bars indicate El Niño years, dark blue bars indicate La Niña years and the grey bars indicate neutral years.<sup>15</sup>

During La Niña events, dry season rainfall tends to be above normal, and the wet season often starts earlier and finishes later. Higher rainfall leads to increased flooding and landslides.<sup>16</sup> Floods in Timor-Leste have destroyed infrastructure

<sup>14</sup> Molyneux, N., Da Cruz, G. R., Williams, R. L., Andersen, R., & Turner, N. C. (2012). Climate change and population growth in Timor-Leste: implications for food security. *Ambio*, 41(8), 823-840.

<sup>15</sup> [https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/5\\_PCCSP\\_East\\_Timor\\_8pp.pdf](https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/5_PCCSP_East_Timor_8pp.pdf)

<sup>16</sup> BOM and CSIRO, 2014. Climate Variability, Extremes and Change in the Western Tropical Pacific: Updated Country Reports. Pacific-Australia Climate Change Science and Adaptation Planning Program Technical Report.

(such as roads, hospitals, schools, community houses and businesses), damaged livelihoods and displaced residents.<sup>17</sup> For example, the 2010-2011 La Niña phase resulted in flooding for a two-year period. According to the Government of Timor-Leste, the flooding resulted in the destruction of 200 homes and affected 14,000 families.<sup>18</sup> Furthermore, unpredictable flooding destroyed the July 2011 harvest and contributed to an estimated 7 % decline in crop yields.<sup>19</sup>

Landslides induced by flooding are reported to be one of the most common disasters in Timor-Leste. A recent analysis of landslide risk revealed that the eastern half of the country is highly prone to landslides.<sup>20</sup> Apart from their potential to cause casualties and damage to communities in Timor-Leste, landslides can also cause major disruption to the fragile road network, isolating communities for long durations. Most of the 3,036 government-run community health centres and 1,252 government health posts are in rural areas; flooding and landslides frequently disrupt road transport between the centres and communities.<sup>21</sup>

El Niño events result in less overall rainfall, bringing a prolonged dry season, and has significant impacts on the availability and quality of water.<sup>22</sup> The most significant impact on the population during El Niño years is reduced ground water availability. The severity of El Niño drought is likely to vary within Timor-Leste; less severe in the central uplands and more severe in coastal areas.

Agricultural productivity is negatively impacted by heat stress, heavy rainfall events and sea level rise. Twenty percent of the population are self-employed farmers and so drought and flooding can have major repercussions on the economy, as well as on food security. Drought and higher temperatures have devastating impacts on crop yields, such as the staple maize crop. In coastal areas, high temperature induces evaporation from rising ground water levels, increasing salt concentration in the rooting zones of plants and reducing their growth and productivity. Increased air temperatures already affect coffee plantations in Timor-Leste and will reduce the areas suitable for coffee. This is of concern as coffee is Timor-Leste's most profitable cash crop and directly employs a quarter of the population.<sup>23</sup> Increases in the sea temperature and drought in Timor-Leste's mainland are also expected to have a negative impact on the availability of fish for inshore fishermen. Extreme rainfall increases erosion and reduces soil fertility, leading to decreased crop yields. Furthermore, sea level rise threatens the viability of low-lying fields (where most of the country's staple rice crop is grown) due to coastal inundation and soil salinization.

### **National priorities, action plans, programs and country ownership for the project**

Timor-Leste has an established early warning response system for tsunamis and earthquakes, which links with existing systems in the region. However, it has no linkage with satellite-based systems for hydrological disasters (e.g. floods, landslides, etc.); as such no systematic and established EWS for hydrometeorological hazards in Timor-Leste exists. The Government of Timor-Leste has identified the critical importance of services relating to climate change, early warning systems (EWS) for climate-related hazards and disaster risk reduction in several national policies and plans as follows:

National Disaster Risk Management Policy (2008)<sup>24</sup> emphasizes the geographical vulnerability of Timor-Leste to disasters induced by climatic change, and the severe impact on socio-economic progress, infrastructure and public livelihoods. The government prioritized the development of policies containing measures to prevent natural disasters, in order to safeguard human lives and property. The policy prioritizes the following:

- Promoting studies concerning the identification of risks zones
- Creating early warning systems, particularly relating to rains and droughts
- Conducting training and capacity building of human resources in the area of disaster risk management
- Providing immediate response when disaster occurs
- Establishing inter-sectoral coordination mechanisms to respond to natural disasters

### Timor-Leste National Adaptation and Program of Action (NAPA) on Climate Change (2010)<sup>25</sup>

The NAPA was developed based on the Timor-Leste's Strategic Development Plan 2011-2030<sup>26</sup> to identify national priorities to address climate change adaption and to monitor the implementation of adaption measures. The program prioritizes community awareness, increased monitoring and risk forecasting, and support for the adaption of government policies and strategies to improve climate change resilience among vulnerable groups. As a Least Developed Country

<sup>17</sup> UNDP, Synthesis report on comprehensive national hazard profile, 2012

<sup>18</sup> UNDP, Synthesis report on comprehensive national hazard profile, 2012.

<sup>19</sup> COP23, Timor Leste (<https://cop23.com.fj/timor-leste/>), 2017

<sup>20</sup> UNDP, Timor Leste: Stay Connected – Reducing Climate Risks, Building the Future, 2016

<sup>21</sup> WMO Feasibility Study

<sup>22</sup> UNDP, Timor Leste: Stay Connected – Reducing Climate Risks, Building the Future, 2016

<sup>23</sup> UNDP, Timor Leste: Stay Connected – Reducing Climate Risks, Building the Future, 2016

<sup>24</sup> [https://www.preventionweb.net/files/22114\\_microsoftword15500nationaldisasterr.pdf](https://www.preventionweb.net/files/22114_microsoftword15500nationaldisasterr.pdf)

<sup>25</sup> <https://unfccc.int/resource/docs/napa/tls01.pdf>

<sup>26</sup> [http://www.searo.who.int/timorleste/publications/Home\\_NATIONAL\\_STRATEGIC\\_DEVELOPMENT\\_PLAN\\_2011-2030.pdf](http://www.searo.who.int/timorleste/publications/Home_NATIONAL_STRATEGIC_DEVELOPMENT_PLAN_2011-2030.pdf)

(LDC) and Small Island Developing State (SIDS), Timor-Leste resolved to seek support to assist with climate change research, adaptation and mitigation.

Environmental Policy (2012)<sup>27</sup> emphasizes that “land-use development and planning of inland areas shall consider the need for integrated management of water resources bearing in mind the potential impacts these may have on coastal areas”.

Timor-Leste Initial National Communication to the UNFCCC (2014)<sup>28</sup>

The Initial National Communication, 2014 (INC, 2014) highlights the national processes in developing the report and identifies the Timor-Leste sources and contributions to emission in the atmosphere. It further identifies some key adaptation actions relevant to the Early Warning Systems:

- Strengthening capacity of national and local institutions as well as communities in managing climate risks through the development of an effective climate information system (improving the skills of climate forecasters) including the development of early warning system and decision support system tools for policy makers.
- Research and development of technologies more adaptive to climate change particularly for key sectors, i.e. agriculture, water resources and coastal/maritime (e.g. development and introduction of crop varieties resistant to climate stresses, climate-proof infrastructure, etc.).

Intended Nationally Determined Contributions (INDC) Timor-Leste (2016)<sup>29</sup>

Section 4.1 of the document highlights the country’s vulnerability to climate change. It focuses on climate-related hazards - such as flood, drought, storm, landslide and wildfires - and their impact on the loss of human lives and livelihoods, the country’s economic infrastructure and environmental resources. Section 4.2.4 lays down the country’s priority adaptation measures in terms of Natural Disasters - “Improve institutional and staff capacity in the disaster sector in relation to climate change induced disasters:

- Establish early warning systems in areas identified as vulnerable to disasters such as floods and storms.
- Integrate climate risk information into traditional disaster risk reduction and management.”

Country Programme of the Democratic Republic of Timor-Leste – Green Climate Fund (2019)<sup>30</sup>

The Country Programme ensures future adaptation and mitigation projects developed under with the Green Climate Fund align with national investment priorities. These priorities have been determined from Timor-Leste’s NDC, NAP budget and project documents, as well as consultations and workshops held with relevant government Ministries in April 2018. As identified in the “climate change threats for the economy, growth and productive sectors” a largely agrarian economy dependent on agriculture is highly exposed to hazards as well as vital infrastructure such as roads, bridges, hospitals and schools. The Country Programme highlights that Timor-Leste’s ability to pursue actions for climate change adaptation and mitigation is dependent on the provision of capacity building, finance and technology transfer.

Timor-Leste Climate Investment Priorities and Projects (2019)<sup>31</sup>

The Timor-Leste Climate Investment Priorities and Projects document summarises the outcomes of the information assessment and workshops with government stakeholders, which identified the agreed rank of mitigation and adaptation activities considered most important for Timor-Leste’s future sustainable development. Adaptation priorities identified by government ministries that would be supported by this project are:

- 1: Build climate proof and environmentally sustainable infrastructure to protect water resources in order to provide safe water supplies.
- 10: Review existing laws, regulations and standards to enhance climate change resilience of critical infrastructure.

The Government of Timor-Leste also has several key agencies relating to the implementation of climate and natural disaster services in the country. These agencies (National Directorate for Meteorology and Geophysics (which performs the Timor-Leste Meteorological Services), Ministry of Agriculture and Fisheries, Ministry of Interior, Secretary of State for the Environment, National Directorate for Climate Change), along with the policies and documents mentioned above, are proofs that the concept of this project and its interventions directly address the priorities and execution procedures already

<sup>27</sup> <https://www.laohamutuk.org/Agri/EnvLaw/2012/DL26EnvBasicLaw4Jul2012en.pdf>

<sup>28</sup> [https://www.undp.org/content/dam/timorleste/docs/reports/ENV/2014-06-INC\\_A4\\_English\\_Executive\\_Summary%20\(2\).pdf](https://www.undp.org/content/dam/timorleste/docs/reports/ENV/2014-06-INC_A4_English_Executive_Summary%20(2).pdf)

<sup>29</sup> <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Timor-Leste%20First/Timor-Leste%20First%20NDC.pdf>

<sup>30</sup> [https://www.greenclimate.fund/documents/20182/1688867/Timor\\_Leste\\_Country\\_Programme.pdf/6840edab-7799-6d9a-083a-6d05ccffcd83](https://www.greenclimate.fund/documents/20182/1688867/Timor_Leste_Country_Programme.pdf/6840edab-7799-6d9a-083a-6d05ccffcd83)

<sup>31</sup> National Directorate Authority, 2019. Green Climate Fund Readiness & Preparatory Support Programme, Climate Investment Priorities and Projects.

in place at Timor-Leste. Further information regarding the Timor-Leste EWS key implementing agencies and stakeholders is detailed in the draft Feasibility Study (Annex 2).

Furthermore, the project is fully aligned with the Sustainable Development Goals (SDGs), the Paris Agreement and the Sendai Framework:

- SDG 13 on urgent action to combat climate change and its impacts and related target 13.1 to “*Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries*”, which is the focus of this project.
- The Paris Agreement, which in Article 7, Sub-paragraph 7(c) calls for “*strengthening scientific knowledge on climate, including research, systematic observation of the climate system and early warning systems, in a manner that informs climate services and supports decision-making*”.<sup>32</sup>
- The Sendai Framework for Disaster Risk Reduction 2015–2030<sup>33</sup>, which in paragraph 33 b) stresses that it is important “*To invest in, develop, maintain and strengthen people-centred multi-hazard, multisectoral forecasting and early warning systems, disaster risk and emergency communications mechanisms, social technologies and hazard-monitoring telecommunications systems; develop such systems through a participatory process; tailor them to the needs of users, including social and cultural requirements, in particular gender; promote the application of simple and low-cost early warning equipment and facilities; and broaden release channels for natural disaster early warning information*”. Furthermore, the Sendai Framework’s *Seven Global Targets* calls for efforts to “*substantially increase the availability and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.*”

### Root causes and barriers

The major barriers to sustainable climate services and MHEWS faced by Timor-Leste are financial, technological, institutional and capacity-oriented in nature. Timor-Leste’s financial inability to support a strong MHEWS induces the other barriers to some extent. Financial support will help to fill the present human resource and equipment gaps, thereby assisting in fulfilling the technical needs. Improved technical capacity can yield greater data availability and improved prediction techniques and impact-based forecasting accuracy. Combined with better coordination between relevant institutions, assistance in capacity development, and the production of targeted information products, these improvements will facilitate the creation of a robust early warning system to benefit different sectors and vulnerable groups. Tailored communication (considering age, gender, occupation, economy and language) regarding hazard awareness, preparedness and understanding of different warning messages to the diverse social population of Timor-Leste would result in enhanced resilience of the population.

The main barriers faced by various relevant agencies, such as National Directorate for Meteorology and Geophysics and the Ministry of Agriculture and Fisheries can be summarized as follows:

- *Financial*: Inadequate funding for operational activities (e.g. data collection and analysis) of key branches in disaster warning and mitigation services is the main obstacle to the development and implementation of climate services. Lack of investment is also a major impediment to national research and development efforts, as well as to building human and institutional capacity.<sup>34</sup>
- *Technological*: Data collection and archival processes are still at the developmental stage; hence the availability of high-quality data is an issue. No systematic cyclone monitoring, tidal monitoring, water resource monitoring or observation network exists.<sup>28</sup>
- *Institutional*: Lack of coordination between agencies that work on climate issues (e.g. National Directorate for Meteorology and Geophysics, Ministry of Agriculture and Fisheries, Ministry of Infrastructure) means that no inter-institutional mechanism for effective climate risk management exists.<sup>28</sup>. Furthermore, the lack of institutional capacity impedes effective coordination of initiatives and dissemination of hazard information to vulnerable communities.<sup>28</sup>
- *Capacity*: A capacity assessment undertaken using the National Adaptive Capacity Framework of the World Resources Institute (WRI, 2009) concluded that “climate risk assessment capacity in Timor-Leste is non-existent as the National Department of Meteorology and Geophysics lacks capacity in data collection, compilation and analysis of climatic data and its connectivity to socio-economic systems.

Since this situation relates to the lack of the technology and infrastructure and high-quality human resources, it is crucial for the government to have relevant technology and infrastructure and technical expertise in place in order to analyse and interpret imminent hazard events and provide relevant information to vulnerable populations. These are the gaps that the government of Timor-Leste is requesting to address and fill, in order to minimize the impacts of the above hazards on vulnerable communities and the country’s economic development.

<sup>32</sup> [https://unfccc.int/sites/default/files/english\\_paris\\_agreement.pdf](https://unfccc.int/sites/default/files/english_paris_agreement.pdf)

<sup>33</sup> [https://www.unisdr.org/files/43291\\_sendaiframeworkfordrren.pdf](https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf)

<sup>34</sup> UNFCCC, Intended Nationally Determined Contributions (INDC) Timor-Leste, 2016

## **B.2. Project/Programme description (max. 3 pages)**

As a Least Developed Country (LDC) and Small Islands Developing State (SIDS) Timor-Leste is highly vulnerable to the effects of climate change and considered to be one of the top 10 countries most at risk to natural disasters.

Landslides, floods and drought are the three climate-related hazards that challenge the economic development of Timor-Leste the most. The impacts of these hazardous events on socio-economic development and human well-being are significant. This bleak natural hazard-prone setting is unfortunately accelerated by Timor-Leste's limited infrastructure and technological and human capacities to provide accurate and actionable warnings to vulnerable communities. Thus, this project intends to enhance resilience of Timor-Leste's population to climate change impacts and climate-related hazards through the following interventions:

### **Component 1: Strengthened national climate services based on systematic data collection and risk knowledge**

#### **Output 1.1: Establishment of National Framework for Climate Services (based on the Global Framework for Climate Services)**

- Institutional strengthening of the Timor-Leste Meteorological Services (within the National Directorate for Meteorology and Geophysics), including through a Quality Management System (QMS) covering the total value-chain of climate services (institutional, operational infrastructure, human resources, systems and processes) and enhancement of its coordination function pertaining to climate services and MHEWS. QMS certification will ensure sustained operations and maintenance in the longer-term.
- Establishment of an inter-ministerial, multi-stakeholder and donor coordination and two-way feedback mechanism to support policy and decision-makers in different sectors to understand and use climate information for the provision of climate services and early warning systems to effectively prepare for and respond to climate-related hazards.
- Strengthening of existing policy and legislation for climate services and early warning (e.g. Timor-Leste's National Risk Management Policy) to facilitate the integration of climate services in key policies, strategies, plans and budgets and provide a foundation for the uptake of climate information and early warning in decision-making and preparedness and response actions.
- Establishment of a financial framework and long-term business model for the sustainability of climate services and MHEWS to facilitate sustainable service provision in the long term beyond the project's duration.

#### **Output 1.2: Systematic data collection and risk assessment for climate-induced hazards**

- Systematic data collection for the identification and analysis of key climate-related hazards (such as landslides, floods and drought) and preparation of dynamic multi-hazard maps. This will be based on the upgrade of and training in the Climate Database Management System and data analysis.
- Vulnerability assessments (social, economic, environmental and physical/geographical) conducted taking into account the exposure of populations, critical assets and economic sectors to climate risks and their preparedness and response capacities. Vulnerability assessments will be performed in line with national hazard mapping and DRR policy and guidance.
- Integration of vulnerability and risk assessment results into Climate Outlook Forums, local risk management plans, warning messages and the early warning system.
- Assessment of existing landcover/land use and the vulnerability of land-related risks (e.g. landslide and soil erosion) through assessment of the overall biomass (namely trees, shrubs and crops) situation. This will include the development of a high resolution landcover/land use mapping, standard operating procedures for satellite land monitoring system and biomass estimation, for 'slash and burn' agriculture, agricultural land use monitoring and land use planning.
- Establishment of a consolidated repository for climate risk information and common process to present climate information at the national level.<sup>35</sup> This will underpin effective adaptation, support the development of capacity in government entities and in scientific and educational communities and support Timor-Leste in complying with their regional and international reporting obligations on climate-related agreements and frameworks. It will also include the development of a permanent agriculture and food & nutrition security statistical system, including development of survey methodologies, implementation of sample surveys and reporting.
- Improvement of the Integrated Phased Classification (IPC) for food security analysis to inform vulnerability assessments, including through capacity development of the IPC multisectoral working group and the generation of alerts and bulletins.
- Establishment of a National Climate Outlook Forum as a platform for communicating information on climate risks, including results of the aforementioned vulnerability assessments, at relevant timescales through a regular and

<sup>35</sup> The Country Level Impacts of Climate Change (CLICC) project is piloting a common process for countries to present the impacts of climate change at the national level that could be useful.

sustained multi-stakeholder dialogue process between the Timor-Leste Meteorological Services and users at the national and local levels.

**Component 2: Hydrometeorological service modernization for enhanced monitoring, impact-based forecasting and early warning services**

**Output 2.1: Strengthened Timor-Leste Meteorological Services to deliver multi-hazard early warning services**

- Implement a robust programme of staff training, capacity building and modernization of the organizational structure of the National Directorate of Meteorology of Geophysics to fit new processes and increased human resources, in compliance with WMO standards.
- Establish early warning centres staffed by trained personnel following appropriate national and international standards (WMO/UNDRR etc.).
- Strengthen the agriculture-specific National Food Security Information and Early Warning System (NIEWS) and related services by improving early warning infrastructure and technologies, including monitoring infrastructures and remote sensing technologies, refining the calibration of the Agriculture Stress Index System (ASIS) tool at national level, the establishment of analysis protocols and the improvement of inter- and intra-ministerial information flows.

**Output 2.2: Expanded and upgraded hydro-meteorological observation network and monitoring capacity**

- Fill gaps in Timor-Leste's hydro-meteorological observation network, as identified in the *attached draft Feasibility Study (Annex 2)*, by increasing the number of Automatic Weather Stations (AWS) and Automated Weather Observing Systems (AWOS) and ensuring their operation, maintenance and dissemination of observation data based on an exhaustive observation network development plan including processes, capacity building and organizational changes.
- Enhancement, modernization and automation of Timor-Leste's hydro-meteorological observation and monitoring network as part of the National Framework for Climate Services (see Output 1.1), using emerging cost-effective technologies and piloting of innovative technologies where possible. Amongst other this would include a strategy for Operation and Maintenance (O&M) of existing AWSs, refurbishment of existing AWSs and attachment of AWSs to manual stations. Furthermore, this would enhance the quality of observed climate data through appropriate calibration equipment, processes and practices to automate meteorological and hydrological stations/posts/transmissions, increase the number of sensors in existing stations, modernize and calibrate equipment and acquire the necessary software for the continuous monitoring of hazard parameters and their precursors.
- Integration of information derived from sector-specific weather stations (e.g. Ministry of Agriculture's weather stations) with the weather stations of the National Directorate of Meteorology of Geophysics.
- Development of fire event monitoring infrastructure and technologies, including remote sensing technologies, interpretation capacity development and alerts. These technological efforts will be complemented by the development of a fire reporting and recording system in order to analyse the sources, agents, motivation and drivers for fires use and wildfire events.

**Output 2.3: Strengthened climate modelling and impact-based forecasting**

- Establishment of accurate impact-based forecasting<sup>36</sup>, i.e. forecasting that considers the vulnerability of people, livelihoods and assets as well as hydro-meteorological hazards (e.g. landslides, floods and drought). This will include the establishment of a System Forecasting Centre and a drought monitoring and forecasting system.
- Enhancement of downscaled climate modelling to predict and project temperatures, rainfall patterns, flood, fires, landslide and drought location etc. for medium- and long-term planning in climate change adaptation, disaster risk reduction, water resources management and other key elements linked to Timor-Leste's climate.

**Component 3: Strengthened dissemination and communication of risk information and early warning**

**Output 3.1: Improved EWS information dissemination mechanisms in provinces/districts**

- Development and implementation of coordinated and integrated protocols and associated capacity to communicate timely climate risk information, early warning alerts and early action messages. This would include the inclusion of climate risk hazards into common alert protocols for warnings, the installation of a Radio Communication System, implementation of an SMS early warning system, social media and other channels, interactive feedback loops between the Timor-Leste Meteorological Services, institutional users and end-users and reinforcement partnerships with the private sector to expand information dissemination channels and feedbacking mechanisms (e.g. SMS, mobile app). Local governments and civil society organizations will play a key role in the dissemination of early warning information and alerts to communities.

<sup>36</sup> [https://www.wmo.int/pages/prog/www/DPFS/Meetings/ET-OWFPS\\_Montreal2016/documents/WMOGuidelinesonMulti-hazardImpact-basedForecastandWarningServices.pdf](https://www.wmo.int/pages/prog/www/DPFS/Meetings/ET-OWFPS_Montreal2016/documents/WMOGuidelinesonMulti-hazardImpact-basedForecastandWarningServices.pdf)

- Enhancement of the village-level food security information system, including monitoring infrastructures, database management, application development and data collection and analysis capacity.

#### **Output 3.2: Public awareness and training of sectors on MHEWS**

- Development of sector-specific communication plans and products for MHEWS in agriculture, food security, health, disaster risk reduction, water resources management, private sector (e.g. insurance), humanitarian sector and ecosystem services amongst others. This will enhance the preparedness and response capabilities of key sectors to climate risks and climate-induced hazards.
- Conduct public awareness and training, as well as information dissemination, on climate risks in Timor-Leste through workshops, seminars and campaigns to prepare the public to adapt to climate change and secure their lives, assets and livelihoods during climate-related hazards such as floods, droughts and landslides.

#### **Component 4: Enhanced climate risk management capacities**

##### **Output 4.1: Improved capacities to prepare for and respond to climate risks and hazards**

- Strengthening of national, sub-national and community capacity to implement risk mitigation and preparedness actions in the window between a forecast and the potential event. This would include outreach and awareness raising activities to strengthen local communities' understanding of and access to warning and risk information associated with climate-related hazards, and the establishment of an enabling environment for early action.
- Consolidate the Ministry of Agriculture and Fisheries' agriculture drought risk management plan implementation capacity, including table-top exercises and test the operationalization of early actions and early response in the agriculture sector after 'stress' and 'crisis' triggers have been declared.
- Implementation of community-based early warning schemes and community-based climate risk management approaches in selected communities, considering the needs of women, young people, indigenous people, disadvantaged and vulnerable groups and learning lessons for upscaling and replicability. Selected communities will be at relatively high risk due to having short lead times for extreme events and/or technical constraints for national systems to effectively service them (e.g. due to their remote locations).
- Engagement and training of selected communities in the design, implementation and operation of early warning systems and centres, including enhancing their understanding of relevant climate-related hazards and exposure, establishing a monitoring and warning service, using traditional knowledge, establishing appropriate dissemination and communication channels and building community response capabilities to promote adaptive livelihood strategies of communities in Timor-Leste to climate-related hazards.

#### **Project Governance and Management**

At the request of the GCF Nationally Designated Authority (NDA) of Timor-Leste, the UN Environment Programme (UNEP) will serve as the accredited entity for the project. The AE will work with a range of partners and executing entities, including Government Entities, FAO and WMO. The project interventions involve synergies with ongoing initiatives of organizations like UNDP, FAO, World Vision, Red Cross, WFP, Oxfam Timor-Leste and coordination with other projects.

As per its GCF Entity Work Programme, the UN Environment Programme offers more than 20 years of experience working on climate change. It brings a comprehensive approach to climate change mitigation and adaptation that is grounded in both natural and economic science and is tied to the environmental and development concerns of countries. Based on its core science-based mandate, one of UN Environment's seven sub-programmes is entirely dedicated to keeping the world environment under review, under which this project will fall. The project will also contribute to the sub-programmes on climate changes and disasters and conflicts.

Through its Science Division, UN Environment has longstanding expertise in environmental and climate change information management and early warning. For example, with GEF and EC funding it is currently supporting over 50 countries in establishing or strengthening their environmental information management systems and using them amongst others for SDGs and MEA reporting. Other examples include the CLIMWARN early warning project and Country Level Impacts of Climate Change (CLICC) project managed within the Science Division. In addition, UN Environment convenes and facilitates regional environmental information networks and the World Adaptation Science Programme (formerly known as PROVIA). Through its work on early warning and foresight, UN Environment enables stakeholders to respond to the latest emerging issues related to environment and climate change.

National Executing Entities (EEs) responsible for specific project outputs and activities for this project are envisaged to include:

- Secretary of State for Environment, National Directorate of Climate Change
- Ministry of Transportation and Telecommunication, National Directorate for Meteorology and Geophysics
- National Directorate for Disaster Risk Management, Ministry of Interior

Technical Assistance Providers:

- World Meteorology Organisation (WMO)
- Food and Agriculture Organization of the United Nations (FAO).
- Bureau of Meteorology (BoM), Australia and other partner National Hydro-meteorological Services as appropriate.

The AE will work closely with the EEs and Technical Assistance Providers to ensure that the project implementation meets UNEP project management policies and GCF standards.

To direct and monitor the project activities, there will be a Project Steering Committee, which will comprise the AE, the relevant ministries led by the three executing government institutions and key Technical Assistance Providers. The Project Steering Committee will provide oversight and guidance for the effective and coordinated delivery of project activities.

**Financial and operational risks**

Table 3: Financial and operational risks

<b>Risk</b>	<b>Category</b>	<b>Mitigation</b>
Political risks affecting key government agencies involved	Political	Involve stakeholders at various levels of governance across governmental and non-governmental organisations to ensure understanding of project benefits and incentive for project continuation.
Lack of coordination between different areas of the Timor-Leste government	Political / Operational	Establishment of an active and engaged project steering committee that will be able to advise and direct the project with respect to issues directed towards the national governance structure.
Potential conflict between stakeholders	Political	Conduct a stakeholder analysis based on extensive stakeholder consultations in the initial phase of the project to identify and address potential conflicts between stakeholders involved in the project (i.e. creating understanding of the respective needs and challenges of both local stakeholders and national institutional players).
Risk of insufficiently tailored climate information, early warning products and services to the needs of users	Operational	Assess end-user understanding of climate information and efficacy of training workshops via a two-way feedback process; engagement with end-users to participate in the formulation of local development plans for early warning products and services.
Long term financial sustainability risks	Financial	Ensure country ownership during project development and implementation; consult and work with Timor-Leste and partners during project development and implementation to improve donor coordination; support mobilization of domestic and additional resources; build capacity in agencies that will continue to receive government support for the foreseeable future.
Low commitment from regional institutions and country level (especially for data sharing)	Operational	During the project preparation UNEP will: assess country data policy; engage in dialogue with Timor-Leste on data sharing, as appropriate, and support the establishment of cooperation agreement for the sharing of data, which respect to national policy; consult with and involve regional institutions in the development of the project.
Low national commitment (from Timor-Leste's National Meteorological Service (NMS), National Hydrological Systems (NHS) and its key partners in the government)	Operational	Engage with stakeholders through extensive consultations to ensure: (1) Understanding and buy-in of the project at the highest government level, as well as involvement of Timor-Leste's NMS, NHS and its key government partners in the planning and implementation phases; (2) Relevant partners (ministries, agencies) are clearly identified, share the vision and goal of the project and are aware of their contribution to the project.
Low performance and delays in implementation (risk is low)	Operational	UNEP will ensure the following: (1) Project Implementation Unit adequately staffed; (2) Governance structure and implementation arrangements understood by all implementing partners; (3) Clear project risk management framework that allows for an effective management of risks and impacts; (4) Capacity gaps of implementing partners assessed and addressed.

Low performance in managing or transparently accounting for project financial resources	Financial	Assess financial management systems of Timor-Leste and executing partners to identify possible weaknesses and ensure compliance with UNEP financial management system and the GCF fiduciary standards; identify any shortcomings in the financial management project using the established Monitoring and Evaluation (M&E) procedure and financial reporting mechanism, including an annual audit; establish internal controls for the project and project fund management.
Risk of poor operation and maintenance of equipment	Operational	Establishment of a schedule for periodic monitoring and maintenance of equipment and a system to record issues with equipment operation; ensure availability of trained staff to respond to issues accordingly and in a timely manner; implement a robust programme of staff training and capacity building in the meteorological service (as detailed in Output 2.1).
Risk of poor retention of trained hydrometeorological staff	Operational	Strengthen the institutional capacity of the Timor-Leste meteorological service such that it will be sufficiently resilient to cope with staff turnover.

### Monitoring and Evaluation (M&E)

The project will be monitored through a comprehensive M&E framework including the following M & E activities.

**Start of project:** A project launching workshop will be held in the first six months of project start-up with project staff, UNEP, National Directorate for Climate Change, National Directorate for Meteorology and Geophysics, Ministry of Interior, WMO, FAO and other potential partners. The initial workshop is essential to strengthen ownership of project results and to plan the first year's annual work plan. An Inception Workshop Report is a key reference document and should be prepared and shared with the participants to formalise the agreements and plans decided during the meeting.

**Periodic monitoring through site visits:** UNEP will visit the project sites according to the agreed schedule in the project's annual start-up / workplan to assess project progress. Other members of the Steering Committee may also participate in these visits. A field visit report will be prepared by UNEP and will be circulated at least one month after the visit of the team and members of the project management unit.

**Mid-term review:** The project will be subject to an independent mid-term review at mid-term of project implementation. The mid-term review will identify progress towards the achievement of results and identify modifications where necessary. It will focus on the efficacy, efficiency and timeliness of the project; highlight issues that require decisions and actions; and present the first lessons learned from project design, implementation and management.

**End of project:** An independent final evaluation will take place three months before the final meeting of the project steering committee and will be conducted in accordance with the guidelines of UNEP and GCF. The final evaluation will focus on the production of project deliverables as originally planned (and modified after the mid-term review, if such modification has occurred). The final evaluation will examine the impact and sustainability of the results, including the contribution to the six criteria in the GCF Investment Framework.

Relevant monitoring and evaluation tools will also be completed during the final evaluation. During the last three months, the project team will prepare the final report of the project. This comprehensive report will summarise the results achieved, lessons learned, problems encountered and areas in which the results may not have been achieved. It will also provide recommendations for further steps to be taken to ensure the sustainability and replicability of the project results.

**Learning and knowledge management:** Project results will be disseminated within and outside the project intervention area through existing networks and information sharing fora. The project will identify and participate, in a relevant and appropriate manner, in scientific, policy and/or other networks that could be useful to learn from for implementation of the project. Finally, there will be an exchange of information between this project and other projects of the same theme.

### B.3. Expected project results aligned with the GCF investment criteria (max. 3 pages)

This project will increase resilience and enhance livelihoods of the population of Timor-Leste through a paradigm shift to evidence-based preparedness, responses actions and decision making related to climate risks. This will be achieved by strengthened climate services and multi-hazard early warning, which are crucial for building the climate resilience of Timor-Leste and its vulnerable communities. As climate-related hazards such as floods, droughts and landslide increase, the project will enhance timely, credible, impact-based and actionable climate and weather information. Moreover, the

project will reach the “last mile” by reaching out to communities with actionable climate information products and targeted early warning alerts. This will eventually lead to a reduction in the number of people affected by climate-related hazards. It is therefore fully aligned with the GCF investment criteria as follows:

**Impact potential:** The proposed project will contribute to two fund level impacts in the GCF Results Management Framework, namely increased resilience of: i) most vulnerable people and communities; and ii) health and well-being, and food and water security. The project aims to strengthen the capacity of Timor-Leste’s government to generate and deliver warnings, as well as work with public and private sector agencies that help communities to access, understand and use warnings of impending hydrometeorological hazards. Up to 80% of the population (approx. 947,000 people) have experienced climate-related hazards in their lifetime and are therefore potential beneficiaries of this project amongst others through improved emergency preparedness and response. The population at risk including women, children, as well as local communities will be prioritised through targeted training and outreach under Component 4. A preliminary cost-benefit analysis (CBA) for EWS in Timor-Leste shows a positive net present value (NPV) of US\$34.2 million with a 9% discount rate and an internal rate of return (IRR) of 79%. Sensitivity analysis has indicated that -potential avoided losses can be as low as 1.93% of total average annual loss (AAL), where NPV reaches zero. The overall conclusion is that proposed EWS interventions will have substantial benefits.

**Paradigm shift potential:**

- Potential for scaling-up and replication: The impact of the project will extend beyond the initial focus of providing EWS for the identified priority hazards of landslides, floods and drought. The EWS will be designed as a Multi-Hazard Early Warning System (MHEWS), given that “many hazards are consecutive/cascading/compound events and have spatio-temporal dependencies”.<sup>37</sup> The impact of extreme climate events is being amplified by climate change, highlighting the increasing importance of improved EWSs. Established EWSs will allow Warning Services for different hazards to gain benefit of shared institutional, procedural, dissemination, resources and response capacities.
- Potential for knowledge and learning: Experience and lessons learned from existing projects/programmes dealing with hydro-meteorological hazards and related EWS in comparator countries, as well as from interventions in Timor-Leste, will be leveraged for the design and implementation of this project. Moreover, lessons from the implementation of this project will be capitalized on to support future interventions in EWS in response to the increasing pressures of climate change.
- Contribution to the creation of an enabling environment and contribution to the regulatory framework and policies: An important focus of this project is to support the establishment of enabling environment including governance frameworks for Disaster Risk Reduction (DRR), Disaster Risk Management (DRM) and EWS. This includes the development and/or strengthening of policy, legal and regulatory frameworks conducive to increased political commitment and general public and private sector awareness and recognition of DRR and DRM as a strategic development priority. This will enable allocation and mobilization of required resources to sustain resilience building. Additionally, data and products from monitoring networks, as well as vulnerability and risk assessment, will enable better understanding and anticipation of the effects of hydrometeorological and climate events including drought and floods, thereby supporting the formulation of adequate adaptation policy, regulation and planning in various social and economic sectors (e.g. land use planning, infrastructure development, water resource management, etc.).

**Sustainable development potential:** Exposure to and impacts of hydrometeorological and climate related disasters hamper sustainable development in Timor-Leste. The proposed project has a high development potential and provides wider development co-benefit. In particular, it has significant social and economic co-benefits. Moreover, the project will support reduction in costs associated with recovery actions, hence increasing capacities of Government of Timor-Leste to invest in other development sectors. Furthermore, the project is fully aligned with the Sustainable Development Goals (SDGs), the Paris Agreement and the Sendai Framework:

- SDG 13 on urgent action to combat climate change and its impacts and related target 13.1 to “Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries”, which is the focus of this project.
- The Paris Agreement, which in Article 7, Sub-paragraph 7(c) calls for “strengthening scientific knowledge on climate, including research, systematic observation of the climate system and early warning systems, in a manner that informs climate services and supports decision-making”.<sup>38</sup>
- The Sendai Framework for Disaster Risk Reduction 2015–2030<sup>39</sup>, which in paragraph 33 b) stresses that it is important “To invest in, develop, maintain and strengthen people-centred multi-hazard, multisectoral forecasting and early warning systems, disaster risk and emergency communications mechanisms, social technologies and hazard-monitoring telecommunications systems; develop such systems through a participatory process; tailor them to the needs of users, including social and cultural requirements, in particular gender; promote the application of simple and low-cost early warning equipment and facilities; and broaden release channels for

<sup>37</sup> <https://mhews.wmo.int/session-4>

<sup>38</sup> [https://unfccc.int/sites/default/files/english\\_paris\\_agreement.pdf](https://unfccc.int/sites/default/files/english_paris_agreement.pdf)

<sup>39</sup> [https://www.unisdr.org/files/43291\\_sendaiframeworkfordrren.pdf](https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf)

natural disaster early warning information". Furthermore, the Sendai Framework's Seven Global Targets calls for efforts to "substantially increase the availability and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030."

**Needs of recipients:** Every year, Timor-Leste faces a high level of risk associated with natural hazards including floods, landslides, strong winds, and droughts<sup>40</sup>. According to a World Bank Country assessment for Timor-Leste<sup>41</sup>, the challenges faced include among others, a weak monitoring system for meteorological and hydrological hazards and a lack of central system for information management. The nature and incidence of increasing climate variability and related hazards are also not well understood. Following are the needs identified by Timor-Leste including: (i) strengthen forecasting capability in Timor-Leste with a short term target of having at least one Automatic Weather Station (AWS) in each of the 13 districts in the country; (ii) better provide weather related data to agencies in a more useful format; (iii) improve systems, servers and models for weather related data; (iv) increasing computer bandwidth in Timor-Leste; (v) develop the EWS in Timor-Leste, support from external agencies is very important and should continue.

**Country ownership:**

Coherence and alignment with the Timor-Leste's climate strategy and priorities in mitigation or adaptation:

Strong country ownership of the project has been facilitated through extensive stakeholder engagement during the projects planning and development phase. The project has been developed through extensive consultation and planning processes with all relevant stakeholders including: UN Environment, World Meteorological Organization (WMO), Food and Agriculture Organization (FAO), Timor-Leste National Directorate for Meteorology and Geophysics, Timor-Leste Hydrology Division and Water Resource Management, Timor-Leste National Directorate for Research and Agricultural Geographical Information Systems, Timor-Leste National Directorate for Disaster Management, as well as other NGOs (Oxfam, World Vision, Red Cross).

The project is consistent with Timor-Leste's priorities in adaptation to climate change. Key policy documents that highlight the urgent need for strengthening MHEWS in Timor-Leste include:

- National Disaster Risk Management Policy (2008)<sup>42</sup> emphasizes the geographical vulnerability of Timor-Leste to disasters induced by climatic changes, which have serious socio-economic impacts in terms of infrastructure damage and lives lost.
- Timor-Leste National Adaptation and Program of Action (NAPA)<sup>43</sup> on Climate Change (2010).
- Timor-Leste's Strategic Development Plan 2011-2030<sup>44</sup> identifies national priorities to address climate change adaptation and to monitor the implementation of adaptation measures. "A National Climate Change Centre will be established ... to conduct research and observation on climate change issues, to ensure data on climate change impacts is being collected and to encourage technological innovation to address climate change adaptation and mitigation. As a least developed country (LDC) and small island developing state (SIDS), Timor-Leste will seek support to assist with climate change research, adaptation and mitigation." The Project will guide Timor-Leste's collective action and support a coordinated approach, addressing the multiple challenges of climate change.
- The Ministry of Commerce, Industry and Environment, on behalf of the Government of Timor-Leste, established their National Climate Change Centre, the Centre for Climate Change and Biodiversity in 2014, based from the National University of Timor-Leste (UNTL).
- Environmental Policy (2012)<sup>45</sup> emphasizes that "land-use development and planning of inland areas shall consider the need for integrated management of water resources bearing in mind the potential impacts these may have on coastal areas".
- Timor-Leste Initial National Communication to the UNFCCC (2014)<sup>46</sup> highlights the national processes in developing the report and identifies the Timor-Leste sources and contributions to emission in the atmosphere.
- Intended Nationally Determined Contributions (INDC) Timor-Leste (2016)<sup>47</sup> focuses on the impacts of climate change on the country's human livelihood, economic development and environmental health.
- The Country Programme of the Democratic Republic of Timor-Leste – Green Climate Fund (2019)<sup>48</sup> highlights the national priorities and needs identified by the Government according to national exposure and vulnerabilities to current and future climate risks.

**Efficiency and effectiveness:** The project seeks to bring added value to existing investments aimed at developing EWS in Timor-Leste through international best practices and technologies to maximize the effectiveness of forecasting and early warnings. It will build on other implemented programs, including:

<sup>40</sup> [www.tl.undp.org/content/dam/timorleste/docs/reports/TL\\_CPR\\_DRM\\_prodoc.pdf](http://www.tl.undp.org/content/dam/timorleste/docs/reports/TL_CPR_DRM_prodoc.pdf)

<sup>41</sup> [http://siteresources.worldbank.org/INTPACIFICISLANDS/Resources/TIMOR\\_LESTE\\_ASSESSMENT.pdf](http://siteresources.worldbank.org/INTPACIFICISLANDS/Resources/TIMOR_LESTE_ASSESSMENT.pdf)

<sup>42</sup> [https://www.preventionweb.net/files/22114\\_microsftword15500nationaldisasterr.pdf](https://www.preventionweb.net/files/22114_microsftword15500nationaldisasterr.pdf)

<sup>43</sup> <https://unfccc.int/resource/docs/napa/tls01.pdf>

<sup>44</sup> [http://www.searo.who.int/timorleste/publications/Home\\_NATIONAL\\_STRATEGIC\\_DEVELOPMENT\\_PLAN\\_2011-2030.pdf](http://www.searo.who.int/timorleste/publications/Home_NATIONAL_STRATEGIC_DEVELOPMENT_PLAN_2011-2030.pdf)

<sup>45</sup> <https://www.laohamutuk.org/Agri/EnvLaw/2012/DL26EnvBasicLaw4Jul2012en.pdf>

<sup>46</sup> [https://www.undp.org/content/dam/timorleste/docs/reports/ENV/2014-06-INC\\_A4\\_English\\_Executive\\_Summary%20\(2\).pdf](https://www.undp.org/content/dam/timorleste/docs/reports/ENV/2014-06-INC_A4_English_Executive_Summary%20(2).pdf)

<sup>47</sup> <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Timor-Leste%20First/Timor-Leste%20First%20NDC.pdf>

<sup>48</sup> [https://www.greenclimate.fund/documents/20182/1688867/Timor\\_Leste\\_Country\\_Programme.pdf/6840edab-7799-6d9a-083a-6d05ccffcd83](https://www.greenclimate.fund/documents/20182/1688867/Timor_Leste_Country_Programme.pdf/6840edab-7799-6d9a-083a-6d05ccffcd83)

- The Africa Caribbean Pacific (ACP) – European Union (EU) Natural Disaster Risk Reduction (NDRR) Program: “The Climate and Disaster Resilience in Communities along Dili-Ainaro and Linked Road Corridors Project kicked off in May 2014 with a workshop for key stakeholders and community members. The project helps reduce the risks that Timor-Leste faces from disasters triggered by natural hazards and minimize the losses that result to its infrastructure assets and livelihoods of poor rural farmers. The project has three main components: Hazard Risks Assessment within the Dili-Ainaro and Linked Roads districts (Ainaro, Aileu, Ermara and Manufahi); Strengthen Capacity at National and District Level in planning/delivering preventative actions; and Community-Based Disaster Risk Management (CBDRM) and Adaptation Projects within Districts connected by Dili-Ainaro Corridor and Linked Roads.”<sup>49</sup>
- World Vision Timor-Leste (WVTL): WVTL has long-term project in four municipalities of Timor-Leste; Aileu, Baucau, Bobonaro, and Covalima. The WVTL has implemented Disaster Risk Reduction (DRR) and disaster response projects in each of these areas and targeted Bobonaro and Covalima with active drought response and drought projects funded by the Australia Humanitarian Response (Australian DFAT), New Zealand MFAT, and German ADH. WVTL's project is aimed at strengthening disaster risk management (DRM) structures, processes and systems, promoting improved disaster preparedness and responding to emergencies in the event of natural disasters in Timor-Leste. This includes the flow of information from national to local levels, and especially in relation to EWSs.
- United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA): Natural Hazard Risks (UNOCHA, 2011) presented a map portraying the risks from earthquakes and tropical storms for Timor-Leste. The maps produced from this study show that the entire country falls under one category of the earthquake intensity that is the Modified Mercalli Intensity (MMI) scale VIII. Similarly, the whole country falls under the Saffir-Simpson scale 1 (118-153 km/h) for tropical storms.<sup>50</sup>

#### **B.4. Engagement among the NDA, AE, and/or other relevant stakeholders in the country (max ½ page)**

Extensive consultations were undertaken through bilateral meetings and workshops organized by WMO and its consultants in 2017-2018. The following stakeholders were involved in the consultation process:

- Government stakeholders: Ministry of Development and Institutional Reform, Ministry of Development for Transport and Telecommunication, Directorate of Meteorological Services, Directorate of Telecommunications, Ministry of Development for Housing, Spatial Planning and Environment; National Directorate of Climate Change and directorate for biodiversity, Ministry of Social Solidarity, Directorate Disaster Management Services, Ministry of Agriculture and Fisheries, National Directorate for Research and Agricultural Information System, Ministry of Health.
- Community level stakeholders: World Vision, Oxfam Timor-Leste.

GCF Timor-Leste workshop (Dili, 23 Nov 2017): The first step of the stakeholder engagement process is the workshop held in Timor-Leste aimed at introducing current implementation of EWS and identifying three priority hazards (flooding, landslide and drought) in Timor-Leste.

Bilateral meetings with Japan International Cooperation Agency and the Food and Agriculture Organization: The bilateral meeting confirmed that EWS needs to be strengthened to enable communities to prepare for and respond to these hydrological and meteorological hazards. For this purpose, the following issues need to be addressed: infrastructure, technology and systems strengthening; legislation review; human capacity building; improving dissemination, and communication of warnings; community response capacity building; EWS management and maintenance; training for technical staff to increase their capacity in analysing and interpreting data related to the hydrometeorology hazards; and disseminating information to communities in disaster prone areas.

High level meeting between Vice Minister of Transportation and Communication Development and Minister of Development and Institutional Reform (Dili, 24 Nov 2017): The meeting determined the focal point to support the project and raised the issue that lack of human resources, infrastructure and legislation should be included in the project.

Letter to the Green Climate Fund to express its interest to cooperate with UN Environment: The head of NDA Timor-Leste sent the letter to GCF on 12 April 2019 to express interest in working together with UNEP as Executing Entity for the Project Preparation Facility (PPF) of the Project “Enhancing Early Warning Systems to build greater resilience to hydro-meteorological hazards”.

### **C. Indicative Financing/Cost Information (max. 3 pages)**

#### **C.1. Financing by components (max ½ page)**

Component	Indicative cost	GCF financing	Co-financing
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<sup>49</sup> [Global Facility for Disaster Reduction and Recovery. 2015. “ACP-EU NDRR Program in the Pacific”. GFDRR, July 2015](#)

<sup>50</sup> [Asian Disaster Preparedness Centre. Timor Leste: A country situation report on disaster risk assessment related initiatives. 2013](#)

	(USD)	Amount (USD)	Financial Instrument	Amount (USD) (indicative amount tbc during FP development)	Financial Instrument (Grant or In-Kind)	Name of Institutions	Name of Institutions
1. Strengthened national climate services based on systematic data collection and risk knowledge	1,600,000	1,500,000	Grants	100,000	Cash, investment and in-kind (tbc)	Government of Timor-Leste, bilateral donors and partners (tbc)	
2. Hydromet modernization for enhanced monitoring, impact-based forecasting and early warning services	10,000,000	9,000,000	Grants	1,000,000	Cash, investment and in-kind (tbc)	Government of Timor-Leste, bilateral donors and partners (tbc)	
3. Strengthened dissemination and communication of risk information and early warning	3,000,000	2,500,000	Grants	500,000	Cash, investment and in-kind (tbc)	Government of Timor-Leste, bilateral donors and partners (tbc)	
4. Enhanced preparedness and response capacity to climate risks	5,400,000	5,050,000	Grants	350,000	Cash, investment and in-kind (tbc)	Government of Timor-Leste, bilateral donors and partners (tbc)	
5. Project Management Unit	1,000,000	950,000		50,000	Cash, investment and in-kind (tbc)	Government of Timor-Leste, bilateral donors and partners (tbc)	
<b>Indicative total cost (USD)</b>	21,000,000	19,000,000		2,000,000			

## C.2. Justification of GCF funding request (max. 1 page)

The GCF grant is requested to provide the crucial public good of climate information and early warning services and their use to reduce the climate risks and enhance the resilience of the population of Timor-Leste, which is vulnerable to multiple climate-related hazards. The climate information and early warning services that will be developed and rolled out under this project will enable them to safeguard their lives, livelihoods and assets from climate-related hazards and risks. This is fully in line with The GCF board Decision B.07/04 (b) in reference to initial results management framework of the Fund: section (iii) Project/Programme level outcomes for adaptation calls for: (5.0) Strengthened institutional and regulatory systems for climate-responsive planning and development; (6.0) Increased generation and use of climate information in decision-making; (7.0) Strengthened adaptive capacity and reduced exposure to climate risks; (8.0) Strengthened awareness of climate threats and risk-reduction processes.

A large proportion (70.4%) of Timor-Leste's population lives in rural areas<sup>51</sup>, which presents the biggest challenge in terms of reaching remote communities for effective EWS. Lack of adequate infrastructure such as roading, electricity, telecommunications and institutional capacity jeopardizes the effective and efficient implementation of EWS countrywide. Economic growth in Timor-Leste averaged 4% in 2012-2016, which was considerably below the average performance for comparator countries. In 2017 and 2018, negative economic growth further diverged from regional trends.<sup>52</sup> Timor-

<sup>51</sup> <http://www.fao.org/timor-leste/fao-in-timor-leste/timor-leste-at-a-glance/en/>

<sup>52</sup> <http://documents.worldbank.org/curated/en/207941557509771185/pdf/Timor-Leste-Economic-Report-Moving-Beyond-Uncertainty.pdf>

Leste experiences various hazards; the three most common significant hazards are landslide, flooding and drought which frequently challenges country's economy development. Impacts include disruption of transportation links, destruction of private houses and public infrastructure (including health service centres), increases in food insecurity, and further negative impacts on the environment and biodiversity. On the other hand, the government of Timor-Leste has limited capacity, infrastructure, technology and funding to provide an early warning system to the vulnerable areas in order to avoid such disasters.

While the project is expected to generate interest in the private sector in using climate information products and MHEWS, cost-recovery is not considered feasible during the project lifespan. Donor and bilateral supports are also currently not available for upscaling MHEWS at the scale required. The GCF is best positioned to provide this grant as no other financing institution, private company or donor is currently likely to do so. Furthermore, Timor-Leste's government institutions, academic institutions and general population are also not in a position to pay for climate information services. Therefore, cost-recovery for these essential services to the public is not practicable. The government of Timor-Leste's debt stock was valued at US\$146 million in December 2018, corresponding to 9% of GDP. The total value of external loans signed as of December 2018 amounted to \$355 million, much of which remains to be disbursed.<sup>53</sup> The first loan agreement dates back to 2012 and the first principal payment was due in 2017.<sup>35</sup> Private sector financing may be difficult to obtain, as the proposed project involves provision of improved climate products and services, which are considered as public goods.

However, public and private sector economic benefits, anticipated from the project due to better management of resources and risks from application of improved climate products and services, could translate to or catalyze further investments in climate-resilient development. Demonstration of avoided cost from impact-based forecasting and response advisories could create incentives for government to increase its funding/investments or develop favourable policies for climate information and early warning services. Similarly, the recognition of climate risks and impacts by the private sector and the communities could lead to the establishment of an insurance market, as impact forecasting could lead to improved risk reduction and lowering of insurance premium rates. It should be noted though that such investments could be realized only after demonstration of the benefits from use of improved climate products and services.

### **C.3. Sustainability and replicability of the project (exit strategy) (max. 1 page)**

This project is designed to address existing root causes and barriers to enhancing EWS for building great resilience against hydrometeorological hazards in Timor-Leste. In particular, the following are key elements of the exit strategy to ensure sustainability beyond the project's lifespan:

- Sustainability and replicability of the project will be facilitated and supported through key partnerships, its alignment with key frameworks and strategies, and its focus on meeting identified user priorities. The Ministry of Development and Institutional Reform (National Directorate of Climate Change, Directorate General for Environment, Cabinet of Vice Minister of Development for Housing, Spatial Planning and Environment) is one of the the executing entities (EEs) of the project. The aim of enhancing EWS is closely aligned with key government policies and commitments, such as National Disaster Risk Management Policy (2008), Intended Nationally Determined Contributions (INDC) Timor-Leste (2016), Environmental Policy (2012), Timor-Leste National Adaptation and Program of Action (NAPA) on Climate Change (2010), Timor-Leste Initial National Communication to the UNFCCC (2014) and the Timor-Leste Green Climate Fund Country Programme (2019). Furthermore, an enabling environment for long-term sustainability will be facilitated by ensuring that proposed interventions are based on meeting the needs of the institutions and the stakeholders/vulnerable population. Urgent needs were established during individual consultations and workshop with stakeholders in Timor-Leste (23-24 November 2017).
- Sustainability of the project will be facilitated by a strategy for Operation and Maintenance (O&M) of the EWS network, equipment and tools, and capacity building efforts during the project. Key elements of this strategy will be financing of goods and services, preventative maintenance of systems and equipment, management objective to improve equipment performance and training and capacity development. The project is committed to providing proper Operations and Maintenance (O&M) to the expanded hydrometeorological hazard monitoring networks. The project will also implement a Quality Management System (QMS), enveloping the total value-chain of climate services (institutional, operational infrastructure, human resources, systems and processes). QMS certification is aimed to ensure sustained operations and maintenance in the longer-term. The project partners will provide support in developing and implementing long-term sustainable strategies for O&M and will also support in designing and disseminating a suite of tailored climate information products. Proper operation and maintenance will provide early detection of equipment problems and may lower repair and replacement costs. More importantly, it will help prevent equipment malfunctions and minimize system downtime. With a formal O&M plan, along with required documentation, the project will have a sustainable plan in the case of an equipment or system failure.

<sup>35</sup> <http://documents.worldbank.org/curated/en/207941557509771185/pdf/Timor-Leste-Economic-Report-Moving-Beyond-Uncertainty.pdf>

- A procurement plan will be developed to enhance the optimum management of goods and services. The design, procurement, establishment of observation systems, forecasting models, information and communication infrastructure platforms (such as the National Climate Outlook Forum), protocols and procedures are all based on a comprehensive assessment of current capacities and requirements (through country consultations at the pilot phase), as well as identified needs and resource capacity - to operate, maintain and sustain the system, and to maximize their long-term benefits. Cost-effective systems suitable for the country will be prioritized for implementation. Thus, the project plans the enhancement, modernization and automation of Timor-Leste's hydro-meteorological observation and monitoring network, engaging emerging cost-effective technologies and piloting innovative technologies, whenever possible. This would include the operation, maintenance and refurbishment of existing AWSs and attachment of AWSs to manual stations.
- A key element of this project's sustainability and exit strategy is the long-term investment plan to be devised to address existing root causes and barriers to a sustainable EWS in Timor-Leste. This will involve new hydrometeorological monitoring equipment and tools for observations, monitoring, modelling and prediction. The EWS will be fully integrated into the national emergency management framework and budgets. The project will adopt a potent multi-stakeholder approach, through collaboration with all stakeholders, NGOs, private sector actors, communities and others representing both producers and consumers of climate information and early warning. Through capacity development activities and outreach, their capacity will be enhanced, and sustainability of results facilitated. Engagement with and support to users for understanding hazard warning information shall be undertaken through a demonstration approach to guide user institutions in facilitating capacity building processes with end users. The public outreach and demonstration outcomes shall be documented, and benefits quantified, to generate evidence for convincing policy and decision-makers to invest in future EWS ventures and ascertain the impacts of the project. Stakeholder participation, capacity building and demonstration approach are among the strategies for project sustainability and replicability. The project will also facilitate the establishment of a financial framework and long-term business model for the sustainability of climate services and MHEWS in order to facilitate sustainable service provision in the long term, extending well beyond the project's duration.
- Replication potential is a major focal point of the proposed project design. Through the consultations with stakeholders and documentation of lessons learned and emerging understanding of best practices, the synthesized project results will assist in the implementation of vital pilot adaptation measures and propose additional strategies, which will build on project activities in the immediate project vicinities and beyond. Specific attention to documenting and disseminating knowledge will facilitate replications and mainstreaming and will be a mandatory part of the project.

#### **D. Supporting documents submitted (OPTIONAL)**

- Map indicating the location of the project/programme
- Diagram of the theory of change
- Economic and financial model with key assumptions and potential stressed scenarios
- Pre-feasibility study
- Evaluation report of previous project
- Results of environmental and social risk screening
- Climate Rationale

#### **Self-awareness check boxes**

Are you aware that the full Funding Proposal and Annexes will require these documents? Yes  No

- Feasibility Study
- Environmental and social impact assessment or environmental and social management framework
- Stakeholder consultations at national and project level implementation including with indigenous people if relevant
- Gender assessment and action plan
- Operations and maintenance plan if relevant
- Loan or grant operation manual as appropriate
- Co-financing commitment letters

Are you aware that a funding proposal from an accredited entity without a signed AMA will be reviewed but not sent to the Board for consideration? Yes  No