



**GREEN
CLIMATE
FUND**

Meeting of the Board
9 – 13 November 2020
Virtual meeting
Provisional agenda item 11

GCF/B.27/02/Add.15

21 October 2020

Consideration of funding proposals - Addendum XV

Funding proposal package for SAP018

Summary

This addendum contains the following six parts:

- a) A funding proposal titled "Enhancing Climate Information Systems for Resilient Development in Liberia (Liberia CIS)";
- b) No-objection letter issued by the national designated authority(ies) or focal point(s);
- c) Secretariat's assessment;
- d) Independent Technical Advisory Panel's assessment;
- e) Response from the accredited entity to the independent Technical Advisory Panel's assessment; and
- f) Gender documentation.

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Simplified Approval Process Funding Proposal



GREEN
CLIMATE
FUND



Project title: Enhancing Climate Information Systems for Resilient Development in Liberia (Liberia CIS)

Country(ies): Liberia

National Designated Authority(ies): Environmental Protection Agency (EPA) of Liberia

Accredited Entity: African Development Bank

Date of first submission: [2020/02/15]

Date of current submission/
version number: [2020/09/25] [V.003]

If available, indicate GCF code: *This code is assigned to each project upon first submission of a Concept Note or Funding Proposal and remains the same throughout the proposal review process. If you have submitted this project/programme previously, please indicate the GCF code here.*

Contents

Section A **PROJECT / PROGRAMME SUMMARY**

This section highlights some of the project's or programme's information for ease of access and concise explanation of the funding proposal.

Section B **PROJECT / PROGRAMME DETAILS**

This section focuses on describing the context of the project/programme, providing details of the project/programme, including components, outputs and activities, and implementation arrangements.

Section C **FINANCING INFORMATION**

This section explains the financial instrument(s) and amount of funding requested from the GCF as well as co-financing leveraged for the project/programme. It also includes justification for requesting GCF funding and exit strategy.

Section D **LOGIC FRAMEWORK, AND MONITORING, REPORTING AND EVALUATION**

This section includes the logic framework for the project/programme in accordance with the GCF Results Management Framework and Performance Measurement Framework, and gives an overview of the monitoring, reporting and evaluation arrangements for the proposed project/programme.

Section E **EXPECTED PERFORMANCE AGAINST INVESTMENT CRITERIA**

This section provides an overview of the expected alignment of the projects/programme with the GCF investment criteria: impact potential, paradigm shift, sustainable development, needs of recipients, country ownership, and efficiency and effectiveness.

Section F **ANNEXES**

This section provides a list of mandatory documents that should be submitted with the funding proposal as well as optional documents and references as deemed necessary to supplement the information provided in the funding proposal.

Note to accredited entities on the use of the SAP funding proposal template

- The Simplified Approval Process Pilot Scheme (SAP) supports projects and programmes with a GCF contribution of up to USD 10 million with minimal to no environmental and social risks. Projects and programmes are eligible for SAP if they are ready for scaling up and have the potential for transformation, promoting a paradigm shift to low-emission and climate-resilient development.
- This template is for the SAP funding proposals and is different from the funding proposal template under the standard project and programme cycle. Distinctive features of the SAP funding proposal template are:
 - *Simpler documents*: key documents have been simplified, and presented in a single, up-front list;
 - *Fewer pages*: A shorter form with significantly fewer pages. The total length of funding proposals should **not exceed 20 pages**; annexes can be used to provide details as necessary;
 - *Easier form-filling*: fewer questions and clearer guidance allows more concise and succinct responses for each sub-section, avoiding duplication of information.
- Accredited entities can either directly incorporate information into this proposal, or provide summary information in the proposal with cross-reference to other funding proposal documents such as project appraisal document, pre-feasibility studies, term sheet, legal, due diligence report, etc.
- Submitted SAP Pilot Scheme funding proposals will be disclosed simultaneously with submission to the Board, subject to the redaction of any information which may not be disclosed pursuant to the [GCF Information Disclosure Policy](#).

Please submit the completed form to:

fundingproposal@gcfund.org

Please use the following name convention for the file name:

“SAP-FP-AfDB-CIS-2020-01-23

A. PROJECT/PROGRAMME SUMMARY					
A.1. Has this FP been submitted as a SAP CN before?		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>			
A.2. Is the Environmental and Social Safeguards Category C or I-3?		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>			
A.3. Project or programme	<i>Indicate whether this FP refers to a combination of several projects (programme) or one project.</i> <input checked="" type="checkbox"/> Project <input type="checkbox"/> Programme	A.4. Public or private sector	<input checked="" type="checkbox"/> Public sector <input type="checkbox"/> Private sector	A.5. RFP	Choose an item.
A.6. Result area(s)			<p><i>Check the applicable GCF result area(s) that the proposed project/programme targets. Indicate for each checked result area(s) the estimated percentage of GCF budget devoted to it. The summed up percentage should be equal to 100%.</i></p> <p><u>Mitigation:</u> Reduced emissions from:</p> <p><input type="checkbox"/> Energy access and power generation: <u>Enter number</u> %</p> <p><input type="checkbox"/> Low emission transport: <u>Enter number</u> %</p> <p><input type="checkbox"/> Buildings, cities and industries, and appliances: <u>Enter number</u> %</p> <p><input type="checkbox"/> Forestry and land use: <u>Enter number</u> %</p> <p><u>Adaptation:</u> Increased resilience of:</p> <p><input checked="" type="checkbox"/> Most vulnerable people and communities: <u>40</u> %</p> <p><input checked="" type="checkbox"/> Health and well-being, and food and water security: <u>40</u> %</p> <p><input checked="" type="checkbox"/> Infrastructure and built environment: <u>20</u> %</p> <p><input type="checkbox"/> Ecosystem and ecosystem services: <u>Enter number</u> %</p>		
A.a.¹ Total investment (GCF + co-finance)		Amount: \$11,431,969.00		A.a.1 Total GCF funding requested	
				Amount: \$10,000,000.00	
A.b. Type of financial instrument requested for the GCF funding			<i>Mark all that apply.</i>		
			<input checked="" type="checkbox"/> Grant <input type="checkbox"/> Loan ² <input type="checkbox"/> Equity <input type="checkbox"/> Guarantees <input type="checkbox"/> Others:		
A.7. Implementation period			5 years (60 months)		
A.8. Total project/programme lifespan		15 years (180 months)		A.9. Expected date of internal approval	
				December 2020.	
A.10. Executing Entity information			The Government of Liberia, acting through the Environmental Protection Agency		
A.11. Scalability and potential for transformation (Eligibility for SAP, max. 100 words)					

¹ These fields will be automatically calculated in the OSS system.

² Senior loans and subordinated loans.

Brief description of how the proposed project/programme will scale-up the previous initiatives, and how it will promote a paradigm shift to low-emission and climate-resilient development.

The project will reduce exposure of Liberia's communities, livelihoods, and infrastructure to climate-induced natural hazards through a well-functioning national Multi-Hazard Impact-Based Forecasting and Early Warning System (MH-IBF-EWS). A well functioning MH-IBF-EWS means having in place trained and equipped Liberia Meteorological Service (LMS), Liberia Hydrological Service (LHS), Environment Protection Agency (EPA), the National Disaster Management Agency (NDMA) to collect weather and climate data; introduce and maintain modelling, forecast weather events and provide early warnings; scale-up evidence-based climate-informed decision-making, planning, and response actions countrywide. Having these in place will lead to transformative change in climate risk reduction and management in Liberia. This new paradigm will focus on translating meteorological and hydrological hazards into the sector- and location-specific potential impacts for the development of sectoral responses to mitigate those impacts. The project's activities will further support the design, development and implementation of strategies and actions in the country that effectively address climate change adaptation and sustainable development needs.

While disaster preparedness, mitigation and response institutions exist in Liberia, there is a lack of coordination across the institutions and no national mechanism for shared generation and use of climate, water, and weather information. The institutions lack the capacity to collect, analyse, disseminate weather and climate data for planning, development, and disaster risk reduction (DRR). There is potential to have airports and Liberia airspace rated unsafe due to inadequate meteorological services because of the poor state of the observing system at Roberts International Airport (RIA). The airport has not started work on implementing an ISO9001 Quality Management System (QMS). The NDMA was only recently promulgated (2012) and still does not have the full staff nor the institutional structures to act as a national convener for disaster management. There is currently no public weather services (PWS) delivery by LMS on television, radio, or any other channel. The DRR institutions have low ability to contribute to efforts to reduce the impacts of land degradation, heatwaves, floods, drought, and sea-level rise.

Inadequate infrastructure to collect, process and share data for weather and climate forecasts, coupled with the limited number of qualified specialists, further inhibits effective climate service delivery. The project will leverage the achievements of the United Nations Development Programme Global Environment Facility (UNDP-GEF) funded "*Strengthening Liberia's Capability to Provide Climate Information and Services to Enhance Climate Resilient Development and Adaptation to Climate Change*" and the Norwegian Water Resources and Energy Directorate (NVE) funded "*Strengthening of the legal framework for the electricity sector and the hydrometric network to support hydropower development in Liberia*" Projects. It will procure and install weather radar, and lightning-detection networks techniques for short-term prediction of thunderstorm movement mitigate the impact of weather in disrupting air traffic management and airline operations at airport and airspace and install Automatic Weather Stations (AWS). It will build effective climate information systems to provide relevant and timely climate products and services needed to inform climate-resilient development. It will enable the beneficiary institution to provide the meteorological and hydrological services required to guide national planning in virtually every sector of the Liberian economy: agriculture, food security, health, water resources, disaster risk reduction, energy and transportation. It will also sustainably transform climate services in Liberia into a technologically driven end-to-end service delivery for private corporations.

The project includes a strong focus on community engagement, training and "Last Mile" communication solutions to elevate understanding of climate risks and achieve sustainable change in behaviour among local communities. The establishment and operationalisation of national and local coordination mechanisms will ensure that all stakeholders know what to do, when and how. The participation of other partners including Nongovernmental Organizations (NGOs), private sector, and academic institutions, will further promote the long-term sustainability of results. This will also create awareness on the importance of climate information services in planning and development, and attract private sector in the delivery of climate information products and services, risk transfer schemes and risk reduction.

The project will partner with the International Federation of the Red Cross Red Crescent (IFRC), including the Liberian National Red Cross Society (LNRCS) and the Red Cross Red Crescent Climate Centre, towards the development of the impact based forecasting methodology for Forecast based Financing as well as ensuring that the last mile is reached through designing activities that address the needs of those at most risk of the climate hazards. Together these partners have the capacity and experience and local expertise to support the four technical components of the project's objectives/goals, in particular through connections to community early warning systems (and the certified trainers within LNRCS), and forecast-based financing. The Red Cross partners will support the establishment of community early warning systems, promote their connection to national early warning systems and enable an effective forecast-based



financing (FbF) mechanism, to ensure climate-informed decision-making, planning, and response by and for the communities most at-risk from climate shocks and extreme weather events.



A.12. Project/Programme rationale, objectives, and approach (max. 300 words)

Description of the project

1. *Climate rationale of the project/programme*

Warming of the climate system is unprecedented, this in addition to climate influences every aspect of nature and human life³. Recent Intergovernmental Panel on Climate Change (IPCC) assessment reports indicated that the intensity and frequency of extremes are likely to increase over many areas including Africa⁴. The frequency and intensity of extremes like droughts, floods, and heat waves are expected to change as earth's climate changes, and these changes could occur even with relatively small mean climate changes⁵. Researchers have made significant attempts to improve the understanding of the climate system in Liberia by providing assessments of past and current climate conditions and projecting future scenarios. These assessments provide a scientific basis for inferring real and potential climate change and related impacts. Of all the Global Climate Observing System (GCOS) Essential Climate Variables (ECV)⁶, surface air temperature and rainfall are of the most widely used parameters to describe the state of the climate system in Liberia.

The temperature in Liberia is defined by its tropical location, where the sun is almost directly overhead all year⁷. The country experiences high temperatures with little variation. The temperature over the whole country ranges from 27-32° C during the day and from 21-24° C at night⁸. Average annual temperatures along the coast range from 24-30° C. Historical analysis of the spatial distribution of observed and modelled averaged annual surface temperature shows variations between 22.5 to 27° C for the period 1976-2005. Though there exist notable spatial differences of about 1 °C or less between the observed and modelled values, the distribution displays a similar pattern of decreasing values from the vast coastline towards the eastern part of the country (Figure A.12.1). Historical trends in annual mean surface temperature derived from Climate Research Unit (CRU)⁹ observation and historical trends in annual mean surface temperature derived from a regional climate model (RCM) participating in the Coordinated Regional Climate Downscaling Experiment (CORDEX)¹⁰ framework, Climate Limited-area Modelling Community (CCLM v4.8.17; hereafter CCLM) are statistically significant at 95% confidence interval (Figure A.12.2). The RCM used, however, represents one of several possibilities that could arise from a wide range of uncertainties due to future emissions, model

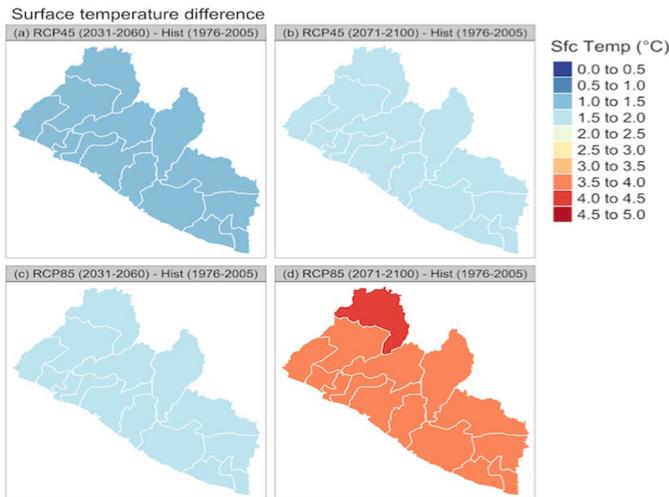


Figure A.12.1: Predicted surface temperature differentials between a baseline period (1976-2005) and future periods (2031-2060 and 2071-2100) for RCP4.5 and RCP8.5

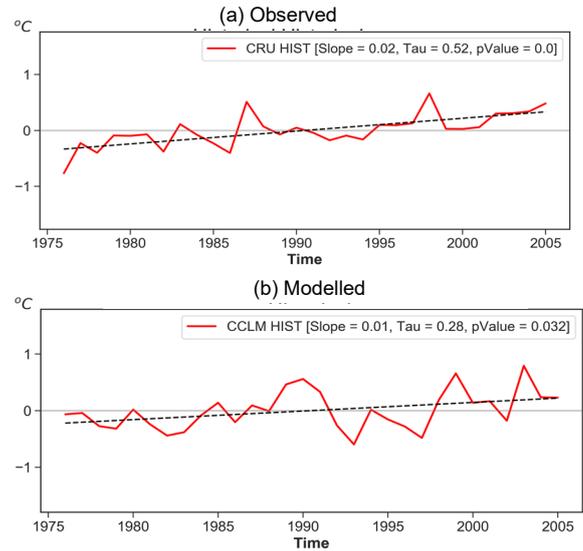


Figure A.12.2: Trends in (a) observed and (b) modelled annual mean surface temperature over Liberia. The black dash lines indicate linear trends in the variable. The plotted values are anomalies relative to historical periods 1979-2005.

formulation and forcing data. These characteristics indicate that lowlands, most notably in areas near the coast, are warmer than highlands.

³ IPCC, Intergovernmental Panel on Climate Change the Physical Science Basis, Cambridge University Press, Cambridge, UK, 2007.

⁴ IPCC, "Managing the risks of extreme events and disasters to advance climate change adaptation," A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change, p. 996, Cambridge University Press, Cambridge, UK, 2012.

⁵ I. Niang, O. Ruppel, M. Abdrabo et al., "Climate change 2014: impacts, adaptation, and vulnerability. Part B: regional aspects," in Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, pp. 1199–1265, Cambridge University Press, Cambridge, UK, 2014.

⁶ <https://gcos.wmo.int/en/essential-climate-variables>

⁷ Gatter, W. (1997) *Birds of Liberia*. Yale University Press, New Haven.

⁸ MPEA (2008) *Liberia's vision for accelerating economic growth. A development corridor desk study*. Ministry of Planning and Economic Affairs, Monrovia.

⁹ <http://badc.nerc.ac.uk/data/cru/>

¹⁰ <https://cordex.org/data-access/esgf/>

Climate models project an average temperature rise of 1.5 - 4.5 °C during the second half of the 21st Century relative to the baseline period 1976-2005. The amount of predicted warming differs based on the model emission scenario, which assumes different levels of greenhouse gas concentrations in the future. Projections of surface temperature show warming of about 1.5 °C and 2.0 °C for the periods 2031-2060 and 2071-2100, respectively. These results are derived from the representative concentration pathway (RCP4.5), a scenario that causes 4.5 Wm⁻² change in the surface energy budget. If the level of greenhouse gases increases further as a result of continuous human activities, this will cause more warming, especially with the RCP8.5 scenario. The RCP8.5 runs projects warming of 2 °C in the period 2031-2060 and even greater warming (reaching 4.5 °C) in the last epoch of the 21st Century (Figure A.12.1). The predicted climate change signals can potentially impact regions of Liberia differently. For example, temperature rises can increase evaporation activities, which may enhance rainfall activities along the coastal region of the country.

The spatial distribution of observed and modelled average rainfall range between 2445 mm and 2782 mm, respectively, for the period 1976-2005 (Figure A.12.3). Annual rainfall in the coastal belt could reach 4000 mm with individual months receiving more than 1000 mm of rainfall during the rainy season between May and November¹¹. Both observed and modelled historical trends in rainfall show increasing trends (Figure A.12.4). The trends are statistically significant in CRU and RCP4.5 of the model. The possibility of having a large amount of rainfall in the country is a clear indication of the likelihood of having more frequent flood events in flood-prone areas, most notably in low-lying areas near and along the vast coastline of Liberia. It is, therefore, important to know how the rainfall will likely vary in the context of warming and emission pathways because of the potential negative impact it could cause to lives, livelihood, infrastructure, and

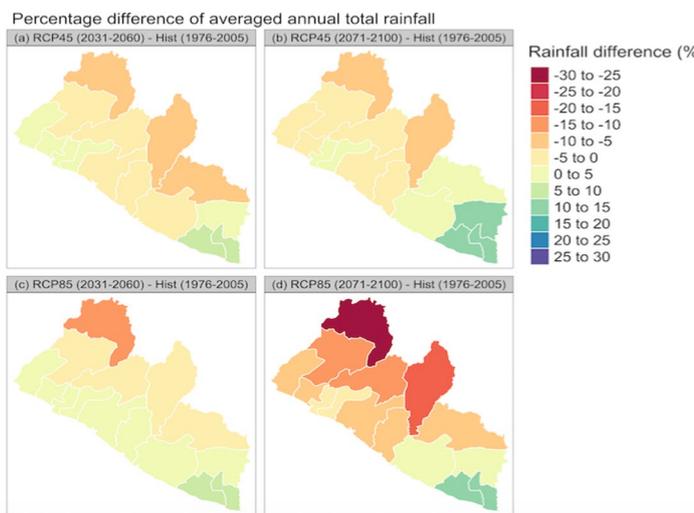


Figure A.12.3: Percentage changes of projected rainfall relative to the baseline period 1976-2005 over Liberia for future periods (2031-2060 and 2071-2100) under RCP4.5 and RCP8.5

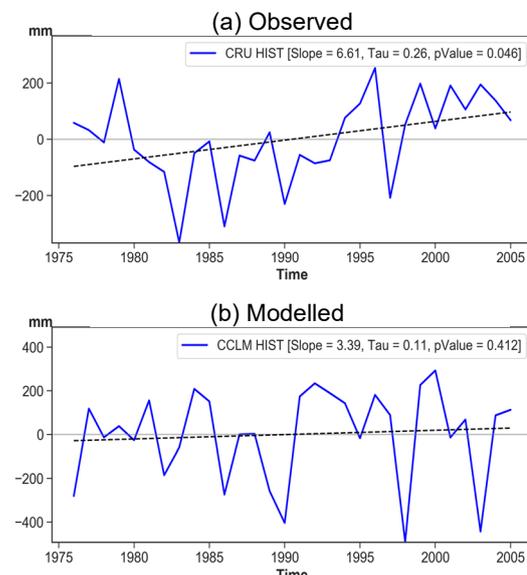


Figure A.12.4: Trends in (a) observed and (b) modelled rainfall over Liberia. The black dash lines indicate linear trends in the variable. The plotted values are anomalies relative to historical period 1979-2005.

environment. For instance, on the 18th of July 2018, a weak El Nino year¹² was accompanied by extreme rainfall that affected over 30,000 people¹³. One way of scaling down the magnitude of similar or more extreme climate-related disasters is to have quality and robust climate information, which is the primary focus of the Green Climate Fund (GCF) project.

Furthermore, the model projects increase and decrease rainfall regimes within the range of -30 to 20% in Liberia (Figure A.12.3). A common feature is a dryer condition towards the inland with negative percentage difference and wetness

¹¹ *McSweeney, C., New, M., Lizcano, G., Lu, X. (2010) The UNDP Climate Change Country Profiles. Bulletin of the American Meteorological Society 91, 157-166.*

¹² <https://ggweather.com/enso/oni.htm> (Assessed 24 Mar 2020)

¹³ <http://floodlist.com/africa/liberia-flooding-montserrado-margibi-monrovia-july-2018> (Assessed on March 19, 2020)

along the coast, most notably in the southernmost part of the country. For the RCP4.5, the rainfall differential lies between -10 to 15%. During the 2071-2100 periods, the rainfall increase is more widely spread around the southern end of the country. Under a worst-case scenario (RCP8.5), the model predicts increased rainfall of about 5% and above across the coastal counties. Also, the model predicts a more intense drying condition over the eastern lateral half of the country. This phenomenon intensifies (i.e., reaching -30%) in the last climate epoch of the 21st Century (2071-2100).

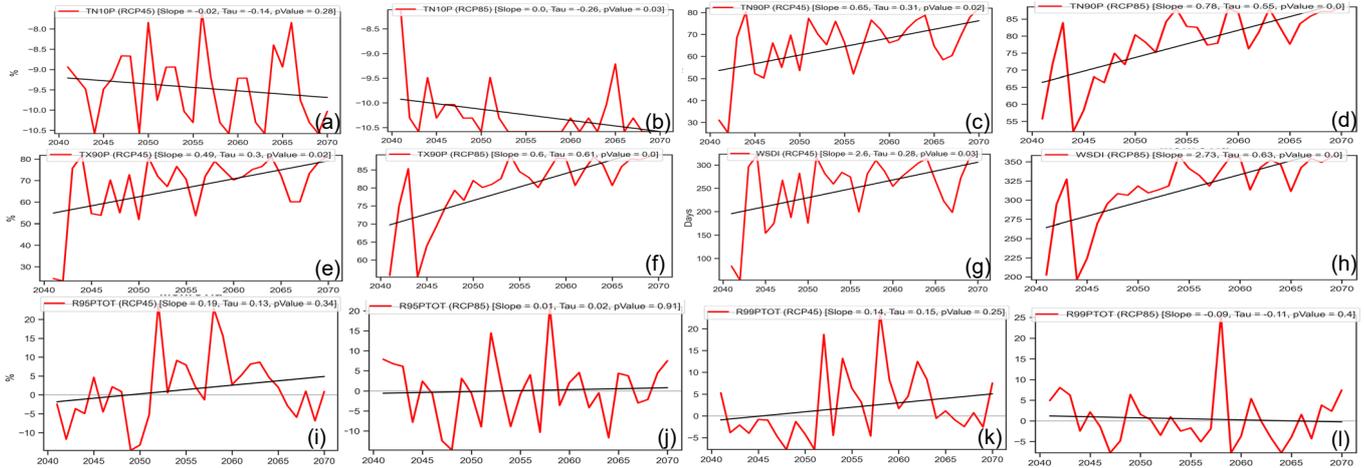


Figure A.12.5: Projected trends in (a,b) cool nights (TN10P), (c,d) warm nights (TN90P), (e,f) warm days (TX90P), (g,h) warm spell duration index (WSDI), (i,j) very wet days (R95PTOT) and (k,l) extreme wet days (R99PTOT) over Monrovia. The indices are generated from daily minimum and maximum temperature using the WMO ET-SCI definitions for corresponding RCP4.5 and RCP8.5. The black lines indicate linear trends in the variable. The plotted values are anomalies relative to historical period 1979-2005. Mann Kendall trend test was performed to examine the significance at 95% confidence interval.

The implication of the projected increase in rainfall suggests a corresponding increase in the frequency of heavy rainfall and flood events, which is a potential threat to lives and livelihood, infrastructure, environment, and vulnerable people and communities.

To further investigate the evidence of changing climate in Liberia analysis of the World Meteorological Organization (WMO) Expert Team core Sector-specific climate indices (ET-SCI) derived from observed and modelled climate records of daily maximum and minimum temperature and daily rainfall¹⁴ was performed. The WMO ET-SCI developed a standardized software ClimPACT to generate these sector-specific climate indices to define simple and complex climate risks and support its integration into the Climate Services Toolkit. Figure A.12.5 presents projected trends in selected indices defined by the WMO ET-SCI. These include (a,b) cool nights (TN10P), (c,d) warm nights (TN90P), (e,f) warm days (TX90P), (g,h) warm spell duration index (WSDI), (i,j) very wet days (R95PTOT) and (k,l) extreme wet days (R99PTOT) plotted for the period 2041-2070 over Monrovia for corresponding future projections from the CLM model under RCP 4.5 and RCP 8.5 scenarios. The black lines indicate linear trends in the variable. The plotted values are anomalies relative to historical baseline period 1979-2005. Mann Kendall trend test was performed to examine the significance at 95% confidence interval.

Projected percentage of TN10P is expected to decrease by 10% compared to the baseline period while trends in index is likely to decrease under RCP4.5 and RCP8.5 scenarios. The modelled decreasing trend is significant under RCP8.5. TN90P show a general increase relative to the baseline (about 80% increase) in the two scenarios. The increasing trend in this index is statistically significant at 95% confidence interval. For TX90P, the model projects a positive change of about 80% and 90% under RCP4.5 and 8.5, respectively. Also, the projected trends are increasing significantly in both scenarios. Trends in WSDI are likely to significantly increase as produced in the model. The difference between the projected and baseline period show possible increase of WSDI, which lies within the range of 100-300days or more in the future. The warming trends found in the model are consistent with recent research where CORDEX simulations over the Pan-African domain show consistency with their driving global model and revealed a robust regional warming exceeding the mean global one over most regions in Africa¹⁵. In the same study, the highest increase in annual mean temperature is found over the subtropics and the lowest over many coastal regions. Also reported is that projected changes in annual mean precipitation have a tendency to produce wetter conditions in some parts of Africa including

¹⁴ <https://climpact-sci.org/indices/>

¹⁵ Nikulin, G., Lennard, C., Dosio, A., Kjellström, E., Chen, Y., Hänsler, A., Kupiainen, M., Laprise, R., Mariotti, L., Maule, C.F. and van Meijgaard, E., 2018. The effects of 1.5 and 2 degrees of global warming on Africa in the CORDEX ensemble. *Environmental Research Letters*, 13(6), p.065003.

central/eastern Sahel and eastern Africa at both 2 °C and 1.5 °C global warming levels (GWLs), although models' agree less in terms of the sign of change. In addition, a consistent difference between 2 °C and 1.5 °C warmings was found for projected changes in annual mean temperature and daily precipitation intensity, which could pose dire implications on African climate and its extremes. Although, not significant, contributions from very wet days (R95PTOT) and extreme wet days (R99PTOT) in the current assessment is expected to increase up to 25% in both scenarios. However, the magnitude of this increase is found to be lesser in RCP8.5. A comprehensive statistical summary of the Mann Kendall trend analysis is presented in Table A.12.1.

Table A.12.1: Statistical summary of Mann Kendall trend test. Bold values are statistically significant trends at 95% confidence interval

Indices	Slope		Tau		p-value	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
TN10P	-0.02	0.00	-0.14	-0.26	0.28	0.03
TN90P	0.65	0.78	0.31	0.55	0.02	0.00
TX90P	0.49	0.60	0.30	0.28	0.02	0.00
WSDI	2.60	2.73	0.28	0.63	0.03	0.00
R95PTOT	0.19	0.01	0.13	0.02	0.34	0.91
R99PTOT	0.14	-0.09	0.15	-0.11	0.25	0.40

Furthermore, analysis of projected core sector-specific indices show that the maximum number of consecutive dry days (CDD) with daily rainfall of less than 1 mm will likely increase (decrease) around inland (coastal) areas for both RCP4.5 and RCP8.5 (Figure A.12.6a). Results found in the inland region agrees with a previous study where more than 80% of ensemble members agree that CDD will increase over the Guinea Coast alongside a projected decrease in CWD at both 1.5 °C and 2 °C global warming levels¹⁶. These projected changes may influence already fragile ecosystems and agriculture in the region, both of which are strongly affected by mean rainfall and the length of wet and dry periods.

The predicted increase in CDD could present unhealthy conditions for plant growth and development in inland areas, where the change is pronounced. This could significantly affect production activities such as agricultural yield, food security and resilience of communities and ecosystems. For maximum number of consecutive wet days (CWD), that is, days with rainfall greater than or equal to 1 mm, the model projects more days along most coastal areas to the north of the country. Inland areas are expected to experience fewer wet days, most especially in Nimba County, where CWD is less than 30 days. These potential changes in CWD could lead to more frequent flood events in coastal areas and

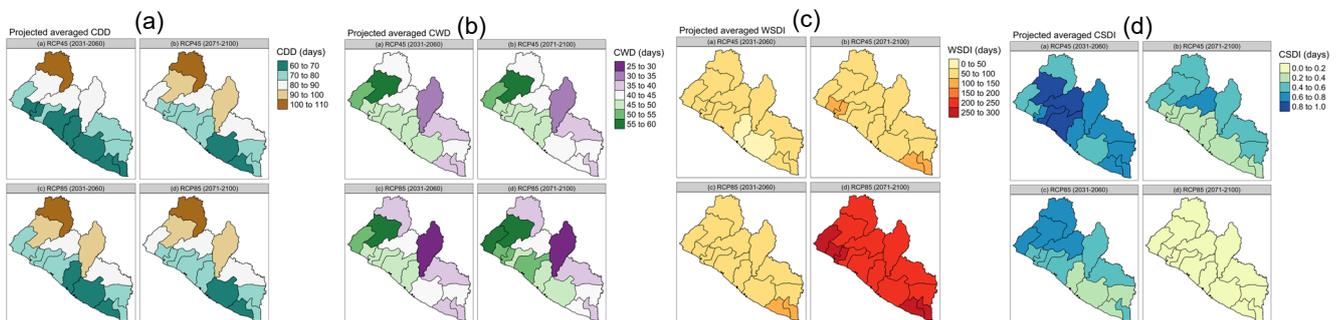


Figure A.12.6: Projected averaged (a) consecutive dry days (CDD), (b) consecutive wet days, (c) warm spell duration indicator (WSDI) and (d) cold spell duration indicator (CSDI) for RCP4.5 and RCP8.5 averaged over 2031-2060 and 2071-2100.

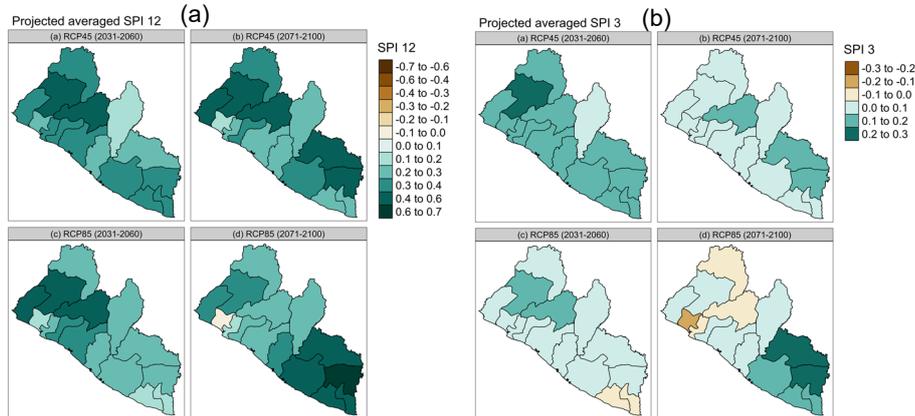
present diverse health issues in areas mostly affected (Figure A.12.6b).

The Warm Spell Duration Index (WSDI) —an annual count of at least six consecutive days when the maximum temperature is greater than 90th percentile—is projected to reach almost 300 days for 2071-2100 under RCP8.5 and less than 100 days during 2031-2060 for the same scenario (Figure A.12.6c, also consistent in Figure A.12.5g&h). Under RCP 4.5, the warm spell days are, on average less than 150 per annum. In contrast, the Cold Spell Duration

¹⁶ Klutse, N.A.B., Ajayi, V.O., Gbobaniyi, E.O., Egbebiyi, T.S., Kouadio, K., Nkrumah, F., Quagraine, K.A., Olusegun, C., Diasso, U., Abiodun, B.J. and Lawal, K., 2018. Potential impact of 1.5 C and 2 C global warming on consecutive dry and wet days over West Africa. *Environmental Research Letters*, 13(5), p.055013.

Index (CSDI) events, the annual count of at least six consecutive days when minimum temperature is less than 10th percentile—is very low (Figure A.12.6d).

Figure A.12.7:
Average standardized precipitation index (SPI) for (a) 12 months and (b) 3 months for RCP4.5 and RCP8.5 averaged over 2031-2060 and 2071-2100.



The Standardized Precipitation Index (SPI) show a measure of drought for 12 months' time scale, and a reflection of annual drought is projected to be mild in Liberia (Figure A.12.7). This implies minimum stress on activities related to hydropower generation. Also, the three months (seasonal) drought is expected to be mild in the northern parts of the country. If intensified, the seasonal drought will impact the growth of seasonal crops. Thus, the need to promote the use of drought-tolerant varieties for seasonal crops in addition to adopting climate-smart agricultural practices for precision farming to ensure food security in Liberia. Although drought is currently not an obvious problem in Liberia, projected increasing temperature serves as a scientific basis for the country to ensure preparedness in this area. The GCF funded activity will ensure the provision of timely and relevant climate information to support both short- and long-term preparedness response plan to further increase the resilience in the eventual occurrence of drought.

These scenarios present dire economic and social implications for the country. Liberia lost approximately 0.02 per unit gross domestic product (GDP) from 1994 to 2013 from climate hazard¹⁷. This resulted in an estimated annual loss amounting to US\$3.79 million in 2013 and US\$ 7.44 million in 2017. The cumulative potential losses resulting from climate hazards in Liberia under the baseline scenario will increase from US\$ 55 million in 2021 to US\$ 136 million in 2030, a net increase of US\$ 86 million in the next decade. The baseline results from a model simulating the impact of climate change in Liberia, anchored on GDP, indicated that a minimum of 7, 000 Liberians suffer direct consequences from climate-related hazards and disasters annually. This number, under the baseline scenario, is expected to almost triple to 15,416 people.

Given that GDP, as a proxy does not fully capture the climate impact, the minimum actual effects of climate-related disasters such as flooding and coastal erosion are estimated to be over 100,000 people presently. In extreme climate scenarios resulting in droughts, floods, coastal erosion, among others, the people affected annually in the next two decades could increase to 177,289 people. Further discussions on the narratives of the climate analysis performed for the project are discussed more extensively in the pre-feasibility study (see Sections 3 and 4 of Annex 13).

2. Objective and goal of the project/programme

The objective of the project is to further strengthen Liberia's climate-related observing and monitoring capabilities, early warning and early action systems, and other environmental-related information systems. It seeks to drive a paradigm shift towards evidence-based climate-informed decision-making, planning, and response. The overarching goal is to integrate green growth, environmental resilience, and adaptation into national development planning¹⁸ through effective climate information systems.

The project properly aligns with the GCF's investment criteria as it proposes to provide timely and relevant climate information to reduce the loss of lives and livelihood, the value of physical assets, and environmental and social losses due to the impact of extreme climate-related disasters and climate change. This outcome will have direct and indirect

positive impacts on the dwellers of the country, mostly on the vulnerable population of the country exposed to the adverse effects of climate change and variability. As a paradigm shift, the project will upscale the existing hydromet infrastructure provided in previous projects and strengthen coordination for improved service delivery in different priority sectors of the Liberian economy to facilitate seamless integration of climate information in national planning. The socioeconomic and environmental benefits of the project are also significant to the creation of jobs, increase income, and improve health and living standards, especially among women.

The stated goal will be achieved through the implementation of activities that will deliver integrated and comprehensive outcomes under five key component as discussed in Section B2.

3. *Climate impacts of the project/programme*

The project will contribute to achieving all four of GCF's Fund-level impacts for adaptation:

1. Increased Resilience and Enhance the Livelihoods of the Most Vulnerable People
2. Increased Resilience of Health and, Well-being, and Food and Water Security
3. Increased Resilience of infrastructure and the built environment to climate change threats

Also, the project will focus on different vulnerable groups, especially women and marginalised groups. It will apply a gender lens to ensure that both men and women benefit from activities aimed at increasing their resilience and capacity to adapt to climate threats in the future. It will also pursue revenue generation for self-sustaining operations by providing climate information services for potential clients such as large-scale commercial farmers, aviation sector businesses, neighbouring countries such as Sierra Leone, Guinea, and Ivory Coast.

The project is expected to deliver benefits both at the national and local levels. **Component 1** (Enhanced Disaster Risk Knowledge of individuals and institutions across the country) will improve the understanding of disaster risk associated with each different hydro-meteorological hazard. This knowledge can inform the design of early warning systems that will guide decision-making processes in aviation, agriculture, fisheries, health, water management, tourism, construction, rail, energy, and forestry sectors, amongst others. It will help to highlight the gap between what is known about natural hazards and disaster mitigation as well as to translate research findings into DRR policies and programs. **Component 2** (Enhanced Detection, Monitoring, Analysis and Forecasting of the Hazards and Possible Consequences) will strengthen the weather, water, and climate value chain by improving existing production, support, and delivery vehicles and establishing a robust hydromet forecasting system. The enhanced support system consists of information communication technology (ICT) systems, quality management systems, technology infusion systems, and capacity building needed in Component 3. Also, in this component, the project will improve data management by developing an end-to-end system to provide tailored services to targeted users, customers, and stakeholders. The application of these user-defined services in priority sectors will guarantee food security and nutrition, improved lives and livelihood, and reduced poverty following the Sustainable Development Goals (SDGs). **Component 3** (Improved warning dissemination and communication) will identify effective communication channels and assess users' and customers' satisfaction. This process is crucial to ensure that climate services get to the last mile. It will also help to understand whether the messages are appropriately packaged or need to be repackaged for the consumption of the end-user. **Component 4** (Improved Preparedness and Response Capabilities through legislation and forecast-based financing (FbF) mechanism) will increase political support and recognition of the Liberian Hydromet Service through appropriate policies and legislation that will help transition the agency into an autonomous body with an improved finance base. It will also set up an FbF mechanism for early actions at community and government levels using pre-planned measures informed by credible forecasts that are funded and implemented **before** a climate shock. These actions will minimise losses and damages caused by climate hazards and reduce the need for humanitarian assistance in their aftermath. Another aspect of this Component will foster close cooperation with regional organisations and other relevant African institutions to support the generation and delivery of weather and climate services. **Component 5** (Co-ordinated Project Management and Implementation across all climate information service units in Liberia) will ensure that both the GCF and African

¹⁷ <https://germanwatch.org/sites/germanwatch.org/files/publication/10333.pdf>

¹⁸ Pro-Poor Agenda for Prosperity and Development (PAPD), MFDP, Monrovia, Liberia (2018)

Development Bank (AfDB) interventions correctly align with adaptation activities to achieve the expected outcomes. Activities under this component include establishing robust results monitoring, evaluation, reporting and learning framework.

4. *The rationale for the use of GCF funding*

Liberia is one of the least developed countries (LDC) in the world and one of the most vulnerable to the impacts of climate change. It has a per capita GDP of 0.06 and a poverty rate of 0.07 on a scale of 0 to 1. The economic growth for 2019 was 0.4 percent against a projected rate of 4.7 percent. Although the country adopts an accommodative monetary policy to meet fiscal needs, the exchange rate depreciated by 28 percent, and inflation grew to 28 percent by the end of 2018. This has led to a decline in the living standards for most Liberians. The deteriorating economic situation threatens the success of the widely acclaimed Government of Liberia's (GoL) 2018 Pro-Poor Agenda for Prosperity and Development (PAPD). The fiscal constraint largely explains the absence of adequate meteorological and hydrological infrastructure to generate, package, and disseminate real-time climate information and help vulnerable communities adapt to climate-related disaster risks and impacts. The Government of Liberia does not have the resources to expand its climate information capacity in short to medium term.

Financial support from the GCF is crucial for scaling up existing efforts to establish a viable climate information centre. The climate information centre will be an infrastructure of public interest, a common good which will help to complement existing infrastructure in Liberia and address gaps in climate information gathering, dissemination, and utilisation, with the ultimate goal of ensuring that the communities in Liberia can adapt to the effects of climate change. The proposed project will also contribute in GoL realising its Nationally Determined Contribution (NDC) and implementing the National Climate Change Policy and Response Strategy (NCCPRS). Boosting the country's capacity to generate relevant and timely climate information has the potential not only to increase its resilience but also provide the avenue to create revenue from internal and external cost recovery.

5. *Short justification for the chosen instrument to be financed by the GCF*

The proposed financing instrument for this project is a grant. As of March 2019, Liberia is listed as a highly indebted country with no clear indication of leaving this category¹⁹. The national poverty line is estimated at 54.1% for 2016

¹⁹ <https://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/16/11/Debt-Relief-Under-the-Heavily-Indebted-Poor-Countries-Initiative> (Accessed 13 Jan 2020)



– 2017, and 20.4% of her population faces multidimensional poverty,²⁰ with a human development index ranking of 176²¹.

²⁰ <http://hdr.undp.org/en/composite/MPI> (Assessed 22 Mar 2020)

²¹ <http://hdr.undp.org/en/countries/profiles/LBR> (Assessed 22 Mar 2020)

In 2018 Liberia's public debt increased from 1,115 million recorded in 2017 to 1,296 million²², an increment of US\$181 million. This shows a rise in the national debt from 33.96% of GDP in 2017 to 39.91% of GDP in 2018, a 5.95 percentage point rise. Minimal fiscal capacity coupled with a wide range of competing national priorities justifies the importance of GCF grant funding.

Beyond these stressed indebtedness levels and fiscal gaps, the national early warning system infrastructure and climate information services foreseen through this project are not meant to generate direct commercial benefits by which financial reflows might have been used for loans repayments, rather the funding is sought by the Government of Liberia in order to have in place common infrastructure that will serve the purpose of climate adaptation.

Moreover, as a Low-Income LDC, it will be challenging for Liberia to underwrite the cost of a loan. Besides, with the exception of the potential revenue generation from the provision of climate information services to ensure the sustainability of the intervention, the activities do not have other avenues for extra cash flow to service a loan repayment. In the absence of grant resources, the proposed interventions will not be possible.

²²<https://countryeconomy.com/national-debt/liberia> (Accessed 13 Jan 2020)

B. PROJECT/PROGRAMME DETAILS

B.1. Context and baseline (max. 500 words)

Climate vulnerabilities and impacts, and adaptation needs that the prospective intervention is envisaged to address.

Liberia is a country on the west coast of Africa. Sierra Leone borders it to its northwest, Guinea to its north, Cote d'Ivoire to its east, and the Atlantic Ocean to its south-southwest. The country lies within latitudes 4-9°N and longitudes 7-12°W with a population of 4.38 million²³, which is expected to reach 6.26 million by 2038. It is characterised by complex orographic terrain around its eastern part (as shown in Figure B.1.1). The country remains vulnerable to the adverse impacts of climate change and variability because of the limited capacity of the Liberian hydro-meteorological services to generate and deliver relevant, accurate, and timely climate information for disaster risk reduction and sustainable development.

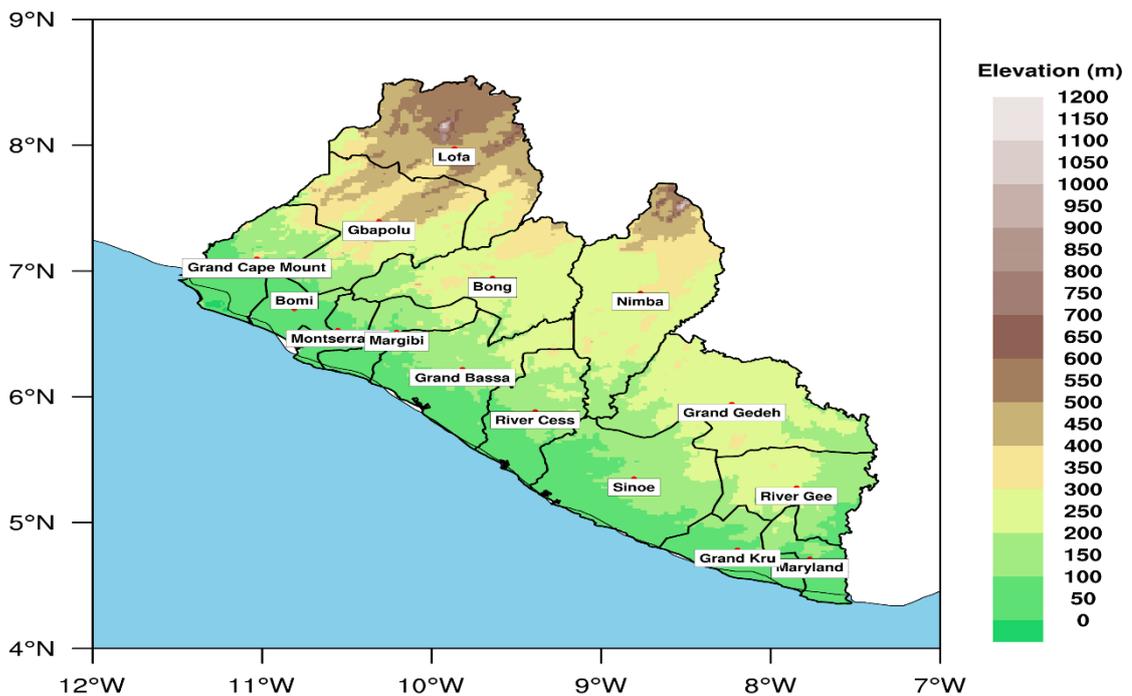


Figure B.1.1: Map of Liberia showing elevation spaced at 50 meters interval

Liberia's greenhouse gas (GHG) emission profile is 3.5Mt as of 2014 with Land Use Change and Forestry, waste, energy, agriculture, and industrial processes accounting for 1.4Mt, 790Kt, 740 Kt, 420Kt and 210Kt respectively. Liberia is a GHG sink considering its land-use cover and emission quota and is committed to reducing its GHG by 10% by 2030 as specified in its NDC. Notwithstanding, the level of poverty and unemployment undermines the country's commitments to reduce its emission footprint.

Baseline scenarios that the proposed intervention seeks to overcome (i.e., emissions baseline, climate vulnerability baseline, resilience/adaptation challenges).

Climate Change Impacts, Risks and Vulnerabilities

Reports from the fifth assessment of the Intergovernmental Panel on Climate Change²⁴ stated that continued emission of greenhouse gases would cause further warming and long-lasting changes in all components of the

²³ Liberia Institute for Statistics and Geo-Information Services (2008) National Population and Housing Census (2008)

²⁴ IPCC (2014). Summary for policymakers. In Climate Change 2014: Impacts, Adaptation, and Vulnerability.

climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems. Projected warming in Liberia is estimated to fall between the values of 1.5–4.5 °C by 2100, threatening the stability of current ecosystems.

Vulnerability to climate change impact can be defined as a function of exposure, sensitivity, and adaptive capacity. The concept of vulnerability is increasingly dominating discussions in Liberian political space with a burgeoning interest in expanding both mitigation and adaptation efforts. Actions are geared towards adopting a practical approach informed by sectoral needs within the national/local circumstances¹⁷. The estimated cost of interventions needed in the priority sectors amounts to USD \$1.94 billion¹⁷.

Sectors at Risk to Climate Change²⁵

The key sectors adversely affected by climate change include forestry and wildlife, agriculture and food security, coastal areas, water, fisheries, energy, mining, industry, transport, tourism, infrastructure, urbanisation and settlement, and health. The brief overview of climate risk associated with key sectors in Liberia is described in Figure B.1.2.

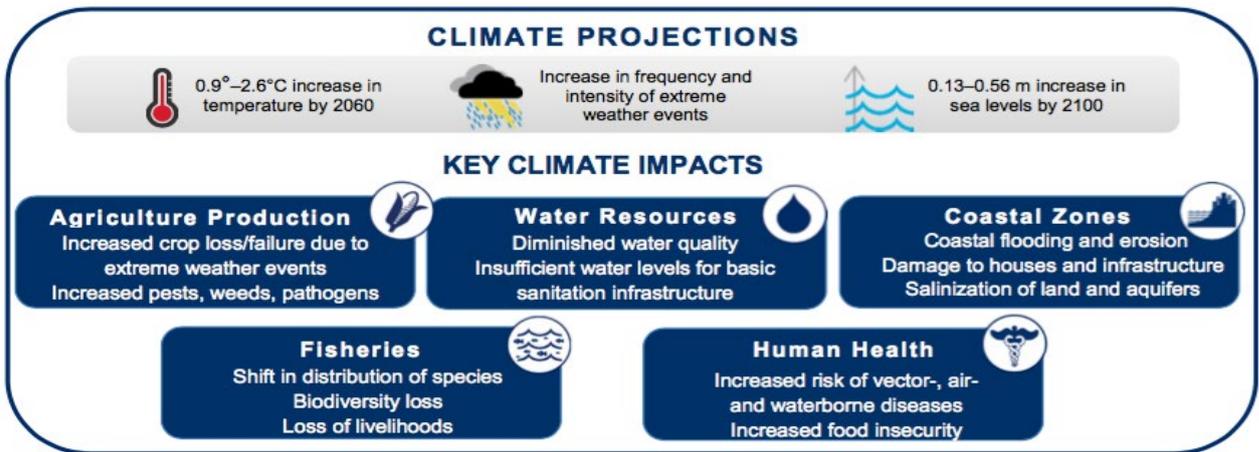


Figure B.1.2: Overview of climate risk in priority sectors²⁶.

Climate change risks, vulnerabilities and impacts make it essential for Liberia to enhance the production of climate information and increase the effectiveness of EWS. It is important to ensure that climate actions are adequately informed by the highest quality climatological, meteorological, hydrological, and related environmental data, products and services. This will contribute to early intervention for the protection of life, property, and the environment; safety on land, at sea and in the air; and sustainable economic development.

Description of recent or ongoing projects that are related to this FP, such as financing from Global Environmental Facility, Adaptation Fund, Climate Investment Funds, or others, and how this project/programme complements these.

Donor Intervention in Liberia Meteorological Service²⁷

²⁵ National Policy and Response Strategy on Climate Change (2018)

²⁶ USAID (2017) Climate Risk Profile in Liberia. The Climate Change Adaptation, Thought Leadership and Assessments (ATLAS).

²⁷ UNDP (2019), United Nations Development Programme Terminal Evaluation – PIMS 4858/GEF 4950. Angelance Browne & Alexandre Borde, Monrovia - March 15, 2019

The GEF funded the “*Strengthening Liberia’s Capability to Provide Climate Information and Services to Enhance Climate Resilient Development and Adaptation to Climate Change*” for an amount equal to US\$6,070,000. The LMS only co-benefited from this fund through fragments of activities performed under the three main outcomes of the project. The project which was implemented from 2014-2018 sought to improve national capacity to generate and use climate and weather information for disaster risk planning and management. The specific objectives were:

1. Increased capacity of hydro-meteorological services and associated networks to monitor and predict extreme weather, climate-related hazards, and climate trends;
2. Efficient and effective use of tailored climate, environmental and socio-economic data to produce appropriate information, which can be communicated to government entities and communities to enable informed decision-making; and
3. Increased awareness in government, private sector and local communities of the major risks associated with climate change, and the use of available information when formulating development policies and strategies.

Project achievements include the procurement and installation of 11 AWS, six agrometeorological stations, and six synoptic stations.

The 11 AWS were deployed in the most populated areas with an emphasis on the agricultural and coastal EWSs (**Figure B.1.3**). The station sites are inside the EWS priority zones identified by UNDP. The Stations are situated on the existing infrastructure of Orange (formerly Cellcom) towers, one of the country’s mobile communication operators. They are interconnected via the internet. The mobile telecom provides uninterrupted electrical power, Internet, and basic preventative maintenance under a Service Level Agreement. The data retrieved from these stations are used by the Earth Network (EN) to provide much-needed real-time weather information to the population and key stakeholders. Also, EN provides comprehensive training and technical support for in-country partners, enabling rapid deployment and high-availability operation of the networks.

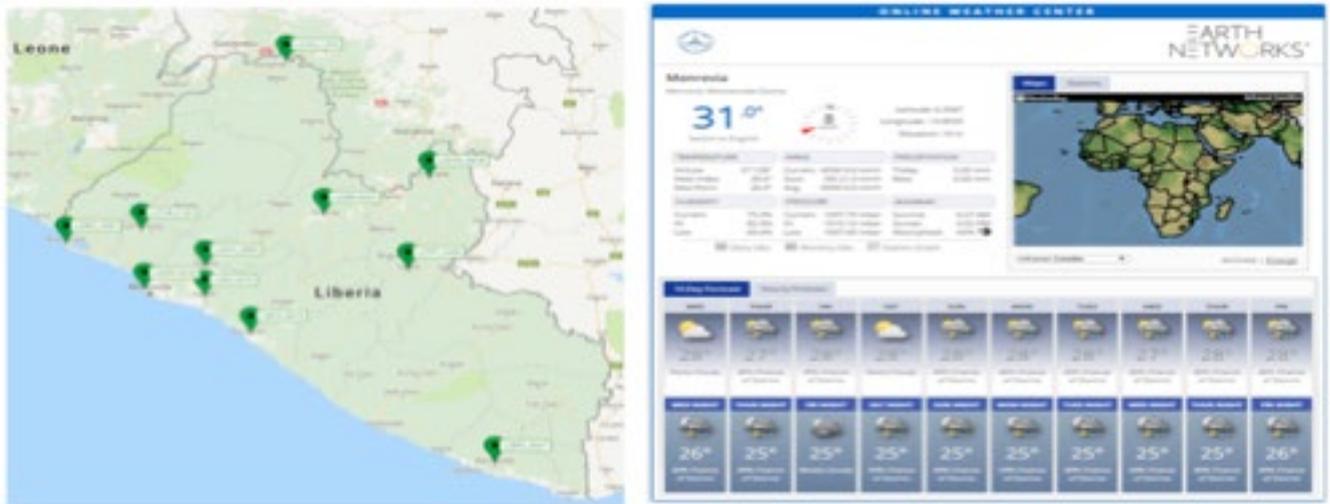


Figure B.1.3: On the right is - Map of the 11 AWS used by the Earth Network to provide real-time weather information. On the left – Image of Online Weather Centre for Monrovia

The GEF project also helped establish an Online Weather Centre (OWC) offering real-time weather observations based on the station’s live reading. Live weather observations are updated every two seconds, and historical weather observations are updated every 15 minutes. The OWC page can access historical observations reaching back 120

days. Lastly, the project trained 28 technical staff from sector agencies, including EPA, Ministry of Transport (MoT), NDMA, Ministry of Mines and Energy (MME), Ministry of Agriculture (MoA), and Ministry of Health (MoH).

Despite these achievements, the country still lacks the capacity to develop a full climate information system. Public dissemination is also an issue: in recent times, radio, television, print media (newspapers, flyers), word-of-mouth, and mobile phone communication channels are being utilised to share climate information. Moreover, the terminal evaluation of the project revealed that it did not deliver all of its outputs within the planned budget and time frame. It was further reported that the achievement of each of the three components was moderate to unsatisfactory compared to expected project outputs. Lastly, it is unclear how the beneficiaries have utilised the limited results.

The proposed projects will build on the achievements of the GEF project and bridge the important gaps remaining. For instance, the GEF project determined the country’s capacity to produce, package, disseminate and govern climate information as 42.5% of the pre-Liberian civil war period. Findings from a survey conducted as part of the current funding proposal show a current capacity of 46.3%, suggesting a substantial difference of 53.7% from the pre-civil war period. The proposed project will help to ensure that Liberia’s climate service delivery is at least at the pre-civil war level.

Moreover, although the OWC seeks to provide real-time weather information to the population and key stakeholders, there is still a wide communication gap as the information gathered only resides on the EN website (Figure B.1.3) and the EWS Project Server at the LMS of the MoT. Thus, the need for the current project to bridge the gap between generated services and end-users, which it will do through **Component 3**, which will identify and develop effective communication channels to ensure that climate information reaches end-users. The information and channels will also serve as revenue generating mechanisms to bolster the financial and operational sustainability of the climate information systems in Liberia.

Donor Intervention in Liberia Hydrological Service

The Liberia Hydrological Service received funding support through NVE’s “Strengthening of the legal framework for the electricity sector and the hydrometric network to support hydropower development in Liberia” Project. The total resources provided by the NVE amount to NOK 20,823,000, (which is equivalent to 2,287,000 USD, disbursed at different periods). The first phase of the intervention began in 2010 to 2015 but was extended by six months because of the Ebola outbreak, making it extend into 2016. Further appeal leads to the initiation of the second phase (2016-2020) that will end in June 2020. The project’s most notable achievement is the procurement and installation of 15 hydrometric stations (see Figure B.1.4), bringing the number closer to the 34 stations the country had before the war. Also, 14 rainfall stations were re-established. It is expected that the rainfall network will be equivalent to half the capacity before the war when the number of functioning stations was 64.

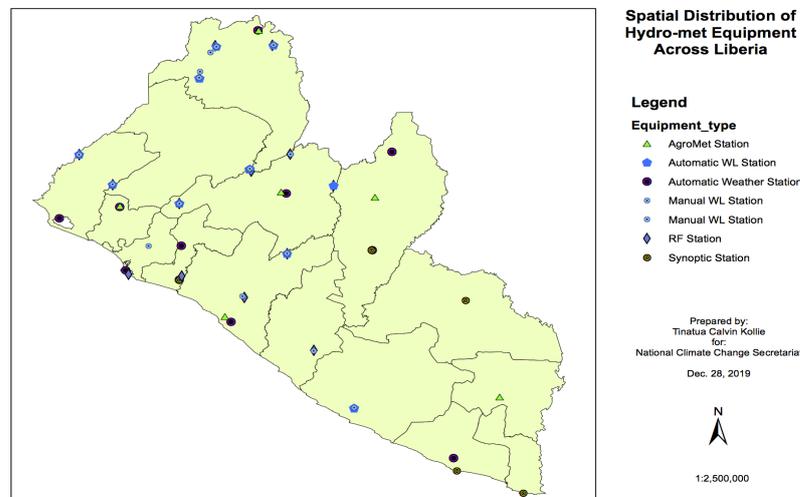


Figure B.1.4: Present Distribution of Hydrometeorological Station Network in Liberia

In the absence of additional financing, these achievements could be at risk once the project closes in June 2020. The proposed project will thus contribute to ensuring the sustainability of the NVE project results by providing financing for the maintenance of equipment and facilitating network observers' operations (vehicle). Also, this will complement the Government's commitment to transition NVE staff to the LHS' payroll.

Operational challenges experienced by NDMA

The NDMA was formed in 2016 through an Act sponsored by the central authority at the national level. NDMA has been formed by an Act of National Legislature: "An Act to Establish the National Disaster Management Agency Republic of Liberia". The main mandate of NDMA is to prepare and implement a plan for disaster management for the Republic of Liberia - the Disaster Management Action Plan (DMAP). The legal foundation for the DMAP is the NDMP validated and endorsed in 2012 by the Cabinet.

NDMA is functionally inadequate in terms of capacity and support. The agency does not have the needed financial and logistical support to function as effectively as required by its mandate. This limitation hindered, at many times, the extent at which disaster victims can be reached for humanitarian aids. Joint efforts by the GoL in collaboration with partners are made through a series of interventions to provide food and non-food items to affected communities in Grand Bassa, Bomi, Montserrado and Margibi counties. Despite these efforts, the NDMA reported that 85% of the recorded 52,726 affected individuals by the 2018 flooding received humanitarian assistance, while 15% could not be reached.

The minimum fund required to run the Agency is estimated approximately to be USD\$1,904,444. In 2018, the NDMA presented a budget of US\$4,867,695 to the national government, but only the sum of US\$930,000 (19%) was approved. Thereby creating a funding gap of USD\$3,939,695 and a budget deficit of USD\$974,444 relative to the minimum fund required.

However, the NDMA's Act states the means through which emergency funding and recovery strategy of Liberia is supposed to be handled. It mandates the establishment of a Disaster Management Trust Fund (DMTF) to contain the Disaster Mitigation Fund and the Disaster Response Fund.

In addition to lack of funds, Liberia's disaster risk management (DRM) is further exacerbated by NDMA's lack of experienced and inexperienced staff. Therefore, an increase in the personnel budget is needed to strengthen its workforce, by establishing its structure throughout the fifteen (15) counties for quick response in case of disaster.

The current project will support the NDMA to align with existing programmes and projects of International Federation of Red Cross (IFRC) as one of the responsible parties to enhance anticipatory response to disasters in Liberia as well as to fill the existential funding gap.

Describe the main root causes and barriers (social, gender, fiscal, regulatory, technological, financial, ecological, institutional, etc.) that need to be addressed.

Agriculture, forestry, and fishery account for 47.3% of Liberia's economic sector activities²⁸. Out of the 508,000 people working in these three sectors, 255,000 (50.2%) are women. Of the 60% rural farmers, 57.9% are also female. Their lack of basic knowledge of climate information makes them vulnerable. Not only are they affected by low yield but also a substantial financial cost. The project will directly impact about 2,312,400 people, including over 600,000 people involved with agriculture, forestry, and fishing activities.

Agriculture employs 67% of the Liberian workforce and is a major contributor to GDP, but key staple and export crops are sensitive to climate. Floods and sea-level rise will impact infrastructure and population centres. Building national and local capacity to understand and respond to climate risks will promote self-reliance in this sector.

As identified in the climate risk screening matrix, climate change may affect the long-term ability of Liberian citizens to support the country's path to economic expansion and self-reliance, for example, by lowering school attendance or exacerbating disease and malnutrition. The project will help address issues related to a healthy, productive, and educated population, with fundamental indicators in health and education already low.

²⁸ Liberia Labour Force Survey (2010)

On the Liberia Roadmap, commitment is lowest for biodiversity and habitat protection. Self-reliance on the natural resource management sector requires a country to have both the capacity and the commitment to manage its critical natural resources sustainably. In Liberia, forests contribute to global emissions reduction targets, safeguard Liberia's water resources, and are vital to rural livelihoods. United States Agency for International Development (USAID)/Liberia will promote education and advocacy to increase political will and public awareness of the importance of building resilience to climate change by conserving biodiversity and forest habitats and safeguarding ecosystem services.

According to the new national climate policy, "the impacts of climate change in Liberia not only undermine development gains but also poses serious risks to food security and adaptive capacity,"²⁹ requiring urgent and concerted national action. As the impacts of climate become evident, climate change may erode the progress that Liberia has already made, and limit potential future gains, including the government's ability to address its development challenges. The project will ensure that climate impacts do not limit economic expansion, stress government institutions, and affect health and education will require a concerted effort from the government, civil society, and citizens to understand, identify and address climate risks.

B.2. Project/Programme description (max. 1,000 words)

Describe the proposed set of components, outputs, and activities that will address the identified barriers and lead to the expected project/programme objective. The description should be provided for each component, output, and activity, and should include a clear rationale for the cause-effect relationship of the interventions in each component. Include a description of the target beneficiaries.

This should summarise the project/programme-level log frame requested in annexe 2 to the funding proposal.

The main objective of this project is to build the resilience of Liberia's social, economic, and environmental systems to climate-induced hazards. The project will strengthen the country's adaptive capacities to integrate better long-term climate risk reduction and adaptation measures in national planning.

The project will achieve its objective through the following five components:

1. Enhanced Disaster Risk Knowledge of individuals and institutions across the country
2. Enhanced Detection, Monitoring, Analysis and Forecasting of the Hazards and Possible Consequences
3. Improved warning dissemination and communication
4. Improved Preparedness and Response Capabilities through legislation and forecast-based financing (FBF) mechanism
5. Co-ordinated Project Management and Implementation across all climate information service units in Liberia.

The project design follows the WMO framework for establishing functioning National Meteorological and Hydrological Services (NMHS). The institutional form of the LMS and LHS will depend on national legislation, national policies on public services, and the role of the private sector in Liberia. Currently, the LMS and LHS are part of the Ministry of Transport and the Ministry of Lands, Mines and Energy, respectively. The hydromet services have not adopted a commercial-oriented business model because they are an agency embedded in government ministries.

The project will support the establishment of the LMS and LHS *climate-smart operational labs*, where the products and services provided by the hydromet actors will be coordinated and further packaged to service priority sectors. These labs will serve information sources for the NDMA, which is responsible for disaster risk reduction activities in Liberia. The importance of the coordination between the various labs and the NDMA is to facilitate the co-designing of hydromet-related hazard impact-based Forecast (IBF). This is crucial to enhancing the timely dissemination of forecasts and warnings to people that are potentially at risk to enable them to make decisions and act proactively.

The structure of the labs is consistent with the overall breadth of services that can be provided in an integrated end-to-end hydrometeorological system (see Figure B.2.1). It depicts the flow of meteorological, hydrological, and related information to produce services. It includes user feedback regarding their needs, the quality of the services and the position of the NDMA, all essential for disaster management. The proposed structure in Figure B.2.1 will ensure that

²⁹ National Policy and Response Strategy on Climate Change (2018)

the operational infrastructure is jointly operated and managed by the hydromet institutions and NDMA, pooling together resources, knowledge/expertise, and assets.

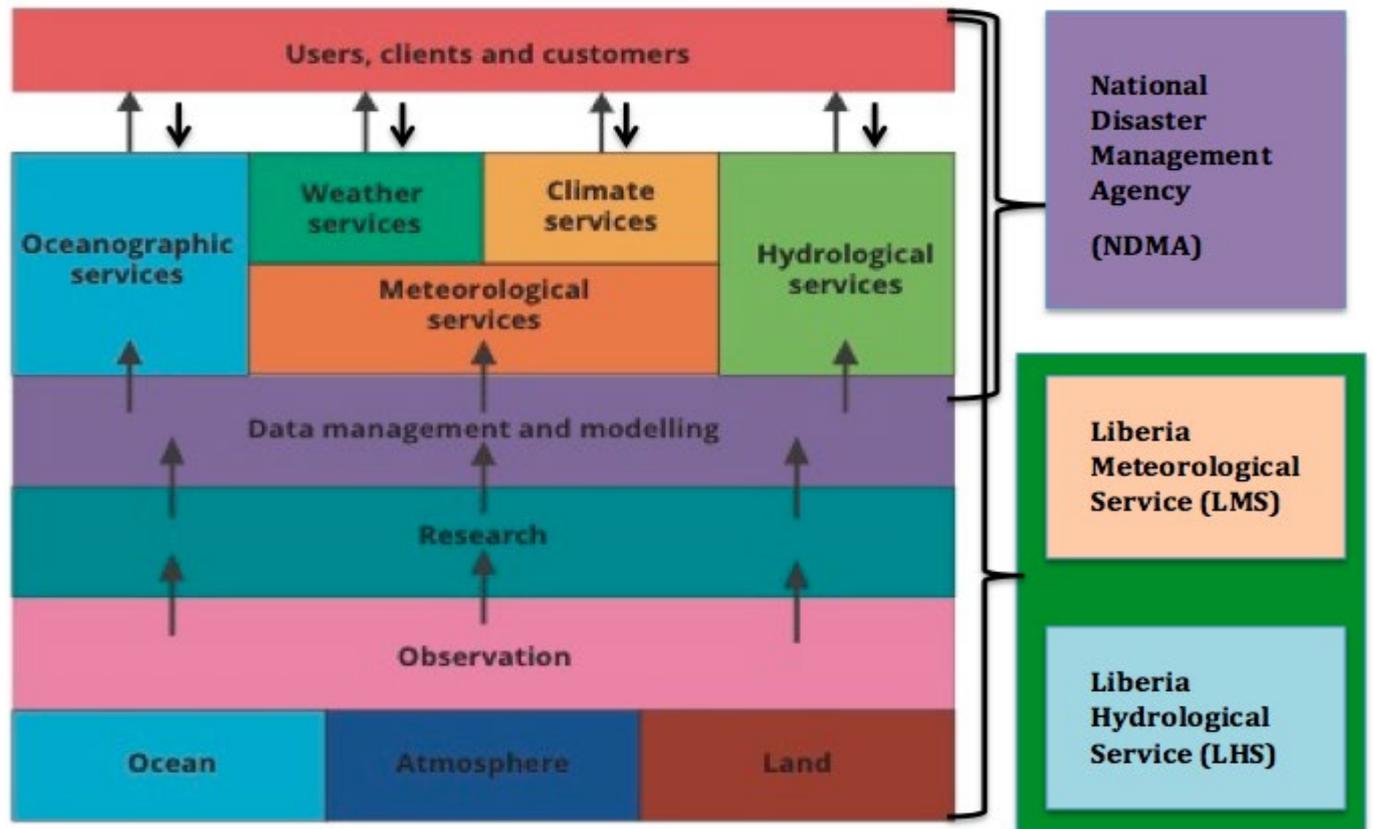


Figure B.2.1: Structure of the proposed Climate Information Services (CIS) showing a range of services that can be provided by LMS and LHS as well as the position of NDMA (Adopted and modified from WMO No 1195³⁰)

Components 1 to 4 of this project is designed to strengthen the weather and climate value chain in Liberia by enhancing proper linkages between production, support, and service systems. The project will conform to the WMO framework that stimulates weather translation and integration (Figure B.2.2). The activities of the project will provide the required platform to facilitate the relationship between weather, climate and hydrological services providers, in this case, LMS and LHS, regional and global producing centres, and internal and external users - including policy-makers, vulnerable people and communities, decision-makers, managers, shareholders, and other interested stakeholders. The platform will provide quality analysis of weather and climate extremes to gain useful insight into how these events translate into hazards. This information will be relevant to estimate the related impacts of the hazards, which gives a better perspective of the situation that will inform adequate adaptation and mitigation options for effective risk reduction and response action.

³⁰WMO (2017) Guidelines on the Role, Operation and Management of National Meteorological and Hydrological Services (WMO-No. 1195)

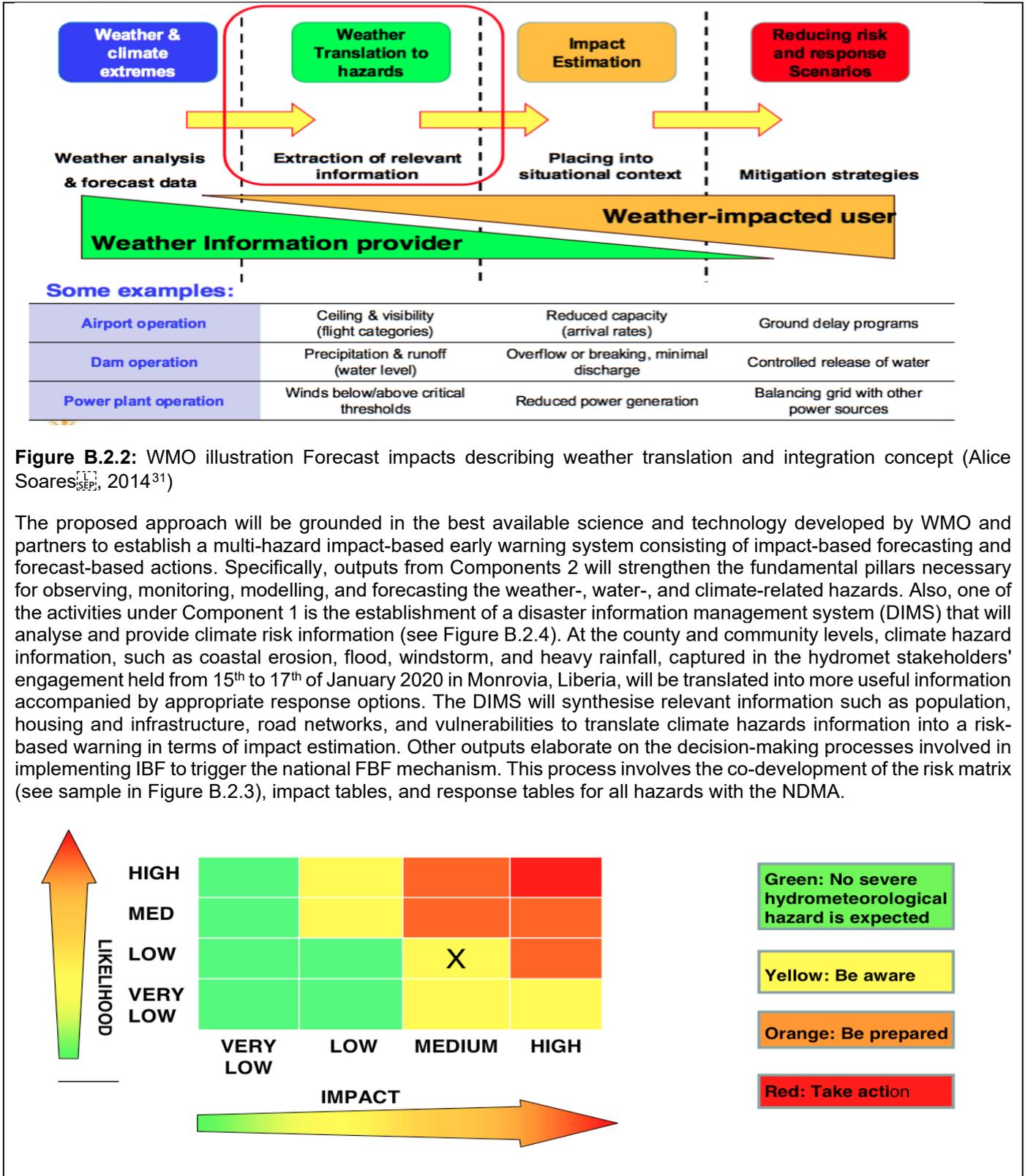
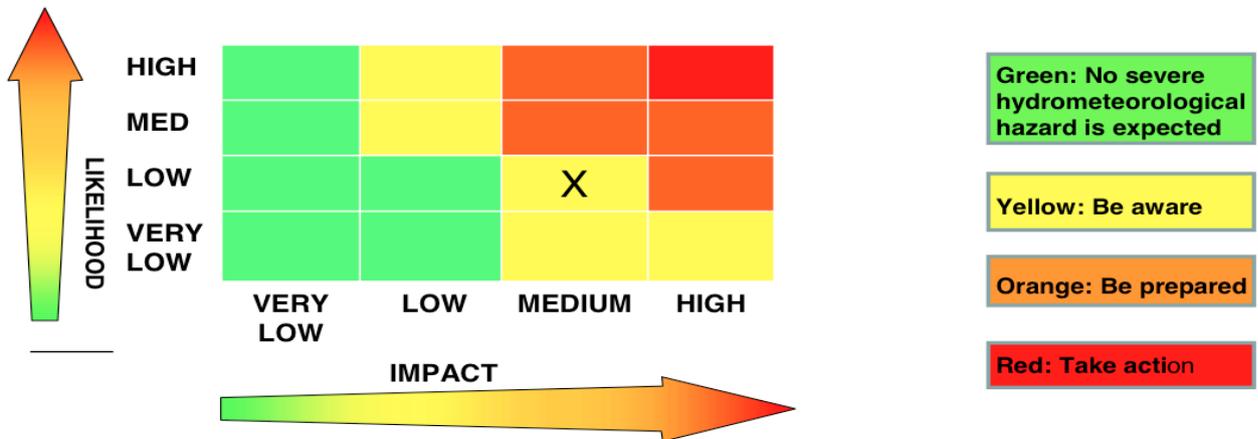


Figure B.2.2: WMO illustration Forecast impacts describing weather translation and integration concept (Alice Soares^[1], 2014³¹)

The proposed approach will be grounded in the best available science and technology developed by WMO and partners to establish a multi-hazard impact-based early warning system consisting of impact-based forecasting and forecast-based actions. Specifically, outputs from Components 2 will strengthen the fundamental pillars necessary for observing, monitoring, modelling, and forecasting the weather-, water-, and climate-related hazards. Also, one of the activities under Component 1 is the establishment of a disaster information management system (DIMS) that will analyse and provide climate risk information (see Figure B.2.4). At the county and community levels, climate hazard information, such as coastal erosion, flood, windstorm, and heavy rainfall, captured in the hydromet stakeholders' engagement held from 15th to 17th of January 2020 in Monrovia, Liberia, will be translated into more useful information accompanied by appropriate response options. The DIMS will synthesise relevant information such as population, housing and infrastructure, road networks, and vulnerabilities to translate climate hazards information into a risk-based warning in terms of impact estimation. Other outputs elaborate on the decision-making processes involved in implementing IBF to trigger the national FBF mechanism. This process involves the co-development of the risk matrix (see sample in Figure B.2.3), impact tables, and response tables for all hazards with the NDMA.



³¹ Alice Soares (2014). Towards Multi-hazard Impact-based Forecast and Warning Services. Second Scientific Seminar on Disaster Risk Management, Brussels, 4-5 Dec 2014

Figure B.2.3: Risk matrix for early warning protocols from hazard to impact-based using collaborative approaches (Alice Soares, 2014)

A national framework for hydromet-related hazards IBF-EWS will be developed to complement the existing National Disaster Management System developed by the NDMA. The community and other relevant stakeholders will use the developed risk matrix as modelled. Both the African Development Bank and the EPA would like to see this project directly generate revenue and become financially self-sufficient. In this regard, a financial and technical resource will be set up to complement the NDMA's response to climate disaster. The EPA will identify potential climate information services clients; this may include large-scale commercial farmers, fishing companies, aviation sector businesses, neighbouring countries such as Sierra Leone, Guinea, and Ivory Coast. The EPA shall continue to explore other grant resources from climate-focused funding organisations to contribute to the sustainability of the project's results and impact.

These measures will be pursued proactively during the project's implementation to ensure a seamless self-sustenance transition after its closure. A percentage of the cost recovery and revenue from the paying clients such as the aviation and marine sectors will be deposited in a special fund for climate disaster events—the Liberian Climate Change Trust Fund (LCCTF). The Fund will be used for two broad activities; the operational cost of the collaborating agencies and institutions established as part of this project after its timeline and a forecast-based early action for climate disaster. The Fund will be managed by the National Climate Change Steering Committee (NCCSC). In addition, the hydromet sector will seek funding opportunities from the WMO Systematic Observations Financing Facility (SOFF) the support for Global Basic Observing Network (GBON).

The establishment of an E-infrastructure for weather and seasonal forecasting, data, and information management will improve the capacity of the LMS and LHS to provide quality and real-time weather forecasts and climate predictions. This activity will be supported by the creation of a community of practice (CoP) in operational numerical weather and seasonal prediction. The CoP will further build the national capacity in the development, use, and management of climate information. Also, weather and seasonal information products will be validated for priority sectors, and forecasts verification systems will be built.

COMPONENTS, OUTPUTS, ACTIVITIES:

Other vital aspects of the project components are highlighted as follows.

Component 1: Enhanced Disaster Risk Knowledge of individuals and institutions across the country

The objective of this Component is to improve the understanding of the risk associated with different hydrometeorological hazards by establishing a decision support system consisting of data management, technical assessment, and decision-making components, as described in Figure B.2.4. Activities under this Component will help to bridge the gap between what is known about natural hazards and disaster mitigation as well as help to translate research findings into DRR policies and programs. The activities will help increase understanding of the interlinkages between DRR, knowledge management, and social learning, contributing to achieving the goals of the Sendai Framework. Activities under this output will promote an improved understanding of the fundamentals of hazards and risks as well as the generation and application of hazard/risk information.

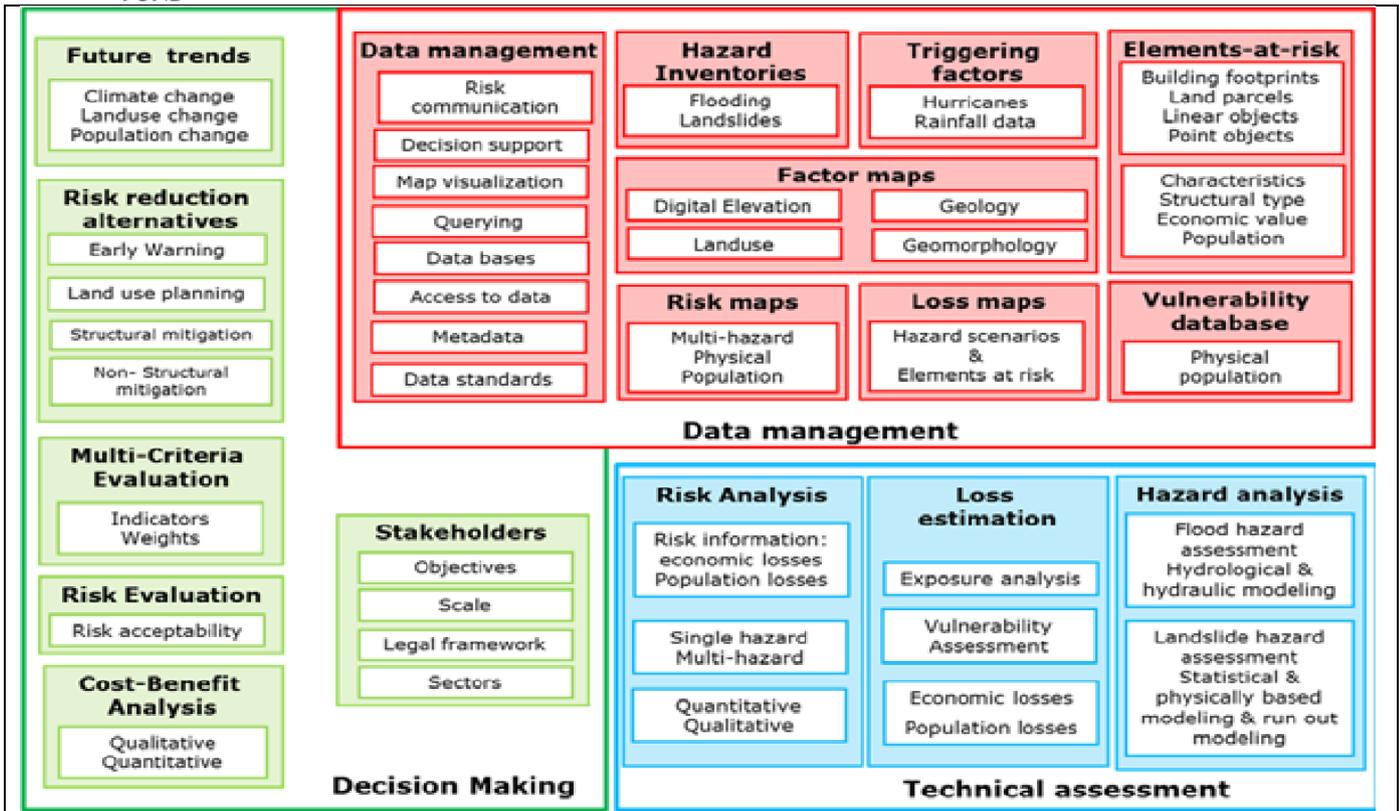


Figure B.2.4: A decision support system for disaster risk management

Output 1.1: Established Guidelines, risk modelling tools and climate knowledge dissemination platform

Activity 1.1.1: Establishment of Guidelines and risk modelling tools – This activity will develop guidelines for streamlining meteorological and hydrological information generation. Also, risk modelling will be conducted under this activity to assess the potential impact of climate-related hazards and accompanying losses - including lives, livelihoods, properties, and cost implications.

Activity 1.1.2: Establishment of internet based geospatial platform – This activity will establish an internet-based Geospatial platform and laboratory at the NDMA for national climate-hazard mapping studies.

Output 1.2: Enhanced risk analysis for the design of Forecast based Financing and capacity building

Activity 1.2.1: Climate hazards assessments, communities consultations and national database – Under this activity a preliminary assessment of climate-related hazards and losses will be conducted. In addition, community level consultation will be conducted. The activity will as well support the development of a database of historical disaster impacts at the national level

Activity 1.2.2: Community based actions and capacity building – This activity will support staff training and capacity building and scale up and establish Community-Based Actions (CBATs) in the counties. The CBATs are one of the disaster response structures within the LNRCS that are selected in consultation with communities to support planning, preparedness, response and recovery from disasters in community. This structure is a link between the National Society (NS) and the community and is usually activated to support preparedness, response and recovery efforts of the NS.

The community-based approach of LNRCS is rooted in the use of existing skills, and competencies at the community to promote sustainability, participation and ownership. CBAT is a grass-root structure LNRCS volunteers which has the following responsibilities:

- Leading community actions to plan for and deal with disaster and or health risks at the community level with strong technical support of the LNRCS field teams
- Work in close conjunction and collaboration with existing community-based organizations to plan and carry out safety and resilience actions in the community
- They are the voice of the community- engage in Advocacy, Education and awareness-raising activities within the community
- Monitor disease trends and refer to nearest health facility
- Follow up with health and disaster threats and report same

Also, the activity will facilitate staff Training on technical services and instrument maintenance and calibration. The below key staff trainings are planned under this activity:

- 6 staff on weather observation (WMO Class IV),
- 3 staff on weather forecasting (WMO Class II),
- 2 staff on numerical weather prediction (NWP) (WMO Class II)
- 2 staff on climate modelling, prediction and scenarios generation (WMO Class II);
- Training of two (2) staff on TV weather presentation at the intermediate level;
- 2 staff on data processing and management (WMO Class III),
- 1 staff on IT and ICT (Advanced level).

- 6 staff from LMS and LHS will be trained on instrument maintenance and calibration (WMO Class III)

Component 2: Enhanced Detection, Monitoring, Analysis and Forecasting of the Hazards and Possible Consequences

The objective of this component is to strengthen the weather, water, and climate value chain by improving the existing production, support, and delivery systems and establishing a robust hydromet forecasting system. The project will also strengthen the linkages between the two systems to supply services that will guide decision-making. Furthermore, the support system comprising ICT systems, quality management systems, technology infusion systems, and capacity building will be enhanced. Lastly, the component will provide the background needed in Component 3 to ensure that services produced do reach the last mile through an improved service delivery system.

Output 2.1: Established Climate smart labs and automated decision management systems

Activity 2.1.1: Development and Operationalization of an automated decision management system for climate services - An automated decision management system for climate services will be developed under this activity. This automated decision management system will be operationalized to enhance retrieval of products and services.

Activity 2.1.2: Establishment of Meteorological and Hydrological labs at LMS and LHS – Under this activity meteorological labs will be established within the LMS for forecasting, observation and instrumentation, remote sensing and satellite, climatology, and agrometeorology units. Also, hydrological lab will be established within the LHS for groundwater and surface water assessment. The EPA will play a supervisory role in the establishment of the labs but the LMS and LHS will be the agencies responsible for operating their respective labs.

Activity 2.1.3: Strengthening environmental monitoring lab and enhancing NDMA emergency operations - The environmental monitoring lab at the EPA will be strengthened under this activity. The National Disaster Management Agency's emergency operations centre will as well be enhanced.

Activity 2.1.4: Installing solar systems for sustainable and uninterrupted power supply – A detailed engineering and installation of a 142 kWp solar system including storage for continuous power supply will be achieved from this task. For more details, see Annex 14.

Output 2.2: Rehabilitated National Meteorological Center (NMC) and Enhanced hydromet observation networks

Activity 2.2.1: NMC Rehabilitation – This activity will rehabilitate the forecast and observing office of the NMC. The rehabilitated office will be equipped and furnished. In addition, the Central Forecasting Office (CFO) will be established and equipped as a department under the NMC.

Activity 2.2.2: Enhancing the Hydrometeorological observation networks – Under this activity, new automatic weather stations and hydrological monitoring stations will be acquired to strengthen existing observing networks. Damaged equipment and measuring instruments, including the satellite receiving systems will be rehabilitated. Specifically, the project will procure forty (40) AWSs, that is, twenty (20) for agro-meteorological and twenty (20) hydro-meteorological stations. These types of AWS are most common in surface observations and required for successful climate adaptation planning purposes. In addition, twenty (20) manual weather stations will be installed for calibration purposes and air-quality systems will be procured for measuring common pollutants; NO₂, NO, O₃ as well as particulates PM₁, PM_{2.5} and PM₁₀ (see Annex 16 for more details). Furthermore, the activity will help to procure and install a weather radar at the Roberts International Airport. Also, the activity will leverage on technological advancement to establish Unmanned Aerial Systems (UAS) for upper air observations. For sustainability, the activity will also set up a facility for the operations and maintenance of hydromet infrastructure. The activity will as well procure and maintain project vehicles.

Output 2.3 Established Quality Management System (QMS) for LMS ³²

QMS will be developed and implemented under this output to enhance the quality of LMS activities, including streamlining and optimising the processes and procedures applied and the products and services provided. In with WMO recommendation³³, the QMS will implement, in phases, three key elements, including WMO technical regulations, quality control and certification procedures. The QM will essentially underpin the ISO 9000 standards and embed such standards in the QMS to provide a sound foundation for achieving the goals and objectives of LMS and WMO programmes. The WMO steps would be adopted to attain the International Organization for Standardization (ISO) standard ISO 9001:2015 (ISO, 2015c), QMS requirements.

Activity 2.3.1: Developing good understanding of QMS, gap analysis and workplan – This activity will develop a good understanding of QMS. Part of this activity will include a desk review with the support of QMS experts in countries that already have implemented such a system. Gap analysis and workplan will also be prepared.

Activity 2.3.2: QMS Policy Development and policy related training – This activity will establish quality policy and quality objectives as well as provide training on QMS and validation of workplan.

Activity 2.3.3: QMS ISO 9001 Certification – A task under this activity will conduct internal audit of the LMS. Lastly, the activity will acquire QMS ISO 9001 certification for the LMS.

Output 2.4: Enhanced climate services information system

Activity 2.4.1: Establishing an E-infrastructure for weather and seasonal forecasting with support system – This activity will establish an e-infrastructure for weather and seasonal forecasting, data, and information management. Also, the activity will build an effective support system with innovative information and communications technology infrastructure for data transmission, storage, processing, quality control, and visualisation.

Activity 2.4.2: Establishment of Communities of Practice – This activity will create a community of practice (CoP) in operational numerical weather and seasonal prediction and forecasts verification. It will also create CoP in development, use, and management of information and e-infrastructure. The Liberia National Red Cross Society (LNRCS) will participate in co-production of forecasts for decision making to bring user perspective, designing forecast thresholds for FbF triggers, and carrying out forecast verification to calculate the probability of acting in vain.

³² <http://www.wmo.int/pages/prog/hwrrp/qmf-h/checklist.php>

³³ https://library.wmo.int/doc_num.php?explnum_id=4141

Activity 2.4.3: Production of seasonal forecasts and related trainings – This activity will produce and validate core weather and seasonal information products for priority sectors. The LNRCS and NDMA to help in facilitating the training of LMS and LHS staff to improve understanding of forecast needs by communities in order to develop tailored products that will be relevant and inform decision-making.

Component 3: Improved warning dissemination and communication

The objective of this Component is to enhance the communication system for service delivery and timely communication of warnings about imminent weather and climate hazards to people and communities at risk. The activity will strengthen the delivery of PWS - including developing new information products for vulnerable communities and the main weather-climate- and hydrology-dependent sectors of the economy. The PWS will provide the appropriate mechanism for translating and interpreting meteorological and hydrological data into impact-based forecasts and communicating this information to sector-specific areas, including disaster risk management.

Early action will focus on the dissemination of warnings on potential impacts in a timely and targeted manner. It will also focus on public education and awareness about hazards—website upgrade; enhanced utilisation of audio-visual weather studio; development of a strategy for social media presence; development of floodplain plans; review of warning dissemination procedures for floods; capacity building including training of trainers - training on appropriate floodplain management and implementation; training on public weather services and impact-based forecasting.

Output 3.1: Effective communication channels and improved public weather services

Activity 3.1.1 : Trainings, surveys, engineering assistance and impact evaluation of dissemination measures – This activity will provide wireless communication training at the International Centre for Theoretical Physics (ICTP), undertake site survey, on-site training, and initial deployment and provide direct engineering assistance. In addition, the activity will provide on-site Internet of Things (IoT) Training in Liberia, conduct surveys to determine ideal communication channels for different users, conduct surveys to ascertain the reach of climate information (feedback) and evaluate the impact of climate information based on users' response/reaction. The beneficiaries of these trainings will include all the participating agencies e.g. LMS, LHS, NDMA, LNRCS.

Activity 3.1.2: Establishment of Public Weather Service studio – Part of this activity will help to procure and install equipment for PWS studio for the LMS. Also, the activity will procure TV weather presentation facilities and system and single size band (SSB) radio communication for staff.

Output 3.2: Improved impact-based risk information service and Community-based EWS communication mechanism

Activity 3.2.1: Delivering improved impact based risk information service - This activity will develop and implement an LMS and LHS information portal. It will also monitor user assessment of services provided by LHS institutions and organisations. Training in media relations will be performed under the activity to improve hydrometeorological data users experiences. The activity will also organise six dialogues in communities vulnerable to climate risk.

Activity 3.2.2: Establishing community-based EWS communication mechanism – This activity will facilitate consultation and engagement with communities on tailored early warning information through Community-based Action teams. It will develop communication guidance and Communication Action Response Plans (CARPs). In addition, it will facilitate a Seasonal Participatory Scenario Planning. The Information, Education and Communications (IEC) materials will be developed in multiple local languages and conduct CBATs in coordination with the NDMA to promote Disaster Risk Reduction awareness and behaviour change. The NDMA in collaboration with the IFRC and LNRCS will establish an Emergency operations Centre to facilitate receipt, analysis and dissemination of the early warning information.

Component 4: Improved Preparedness and Response Capabilities through legislation and forecast-based financing (FBF) mechanism

The objective of this Component is to increase political support and recognition of the Liberian Hydromet Service through appropriate policies and legislation to support the transition of the hydromet services into an autonomous body with an improved finance base. This will enhance the preparedness and response to weather- and climate-

related hazards using a proactive mechanism called FBF. FBF is an innovative mechanism that supports the pre-planning of early actions at community and government levels. Early action is grounded on credible forecasts and funded and implemented before a climate shock. These early actions minimise loss and damage caused by climate hazards and reduce the need for humanitarian assistance in their aftermath. Activities are closely aligned with national priorities and leverage local field expertise. Also, the IFRC, and other humanitarian organisations will support the implementation of this component

Building long-term resilience and preparedness in Liberia will strong, inclusive and well-implemented disaster laws that underpins a well-functioning disaster risk management system and is essential to prevent and reduce the impact of disasters. The laws provide the legal and institutional basis on which to undertake all aspects of disaster risk management from risk reduction, preparedness to response and recovery, and contribute to strengthening the resilience and the protection of vulnerable and disaster-affected populations. In this respect, this component will also aim at mapping the existent legal framework for disaster management, identifying the gaps and providing technical support in the strengthening of the legislation in light of international commitments and recommendations.

In this regard, the GoL will collaborate with county-level partners to determine early warning indicators and thresholds and develop Standard Operating Procedures to implement early actions at government and community level. The project will also work with national meteorology/hydrology services and partners like the Red Cross to strengthen in-country weather forecasting capacities and to integrate early warning systems into national preparedness plans. Figure B.2.5 summarises the FBF process.

Forecast-based Financing significantly changes traditional response mechanisms through national and community level action before a climate shock. Figure B.2.5 demonstrates how the approach complements existing emergency response mechanisms and resilience-building during post-disaster recovery.

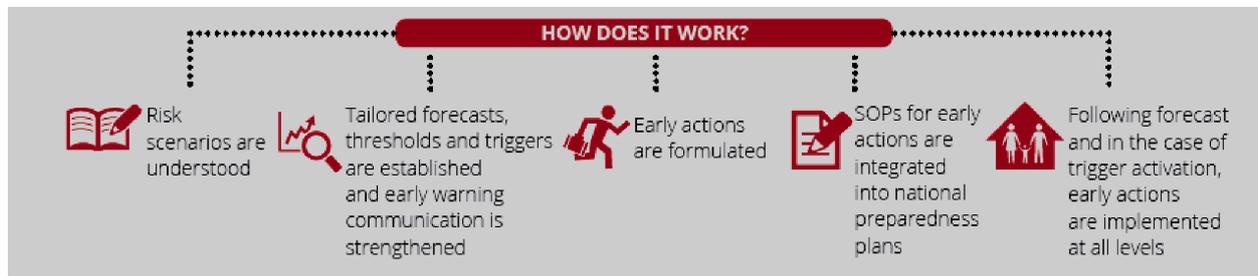


Figure B.2.5: Illustration of the FBF mechanism

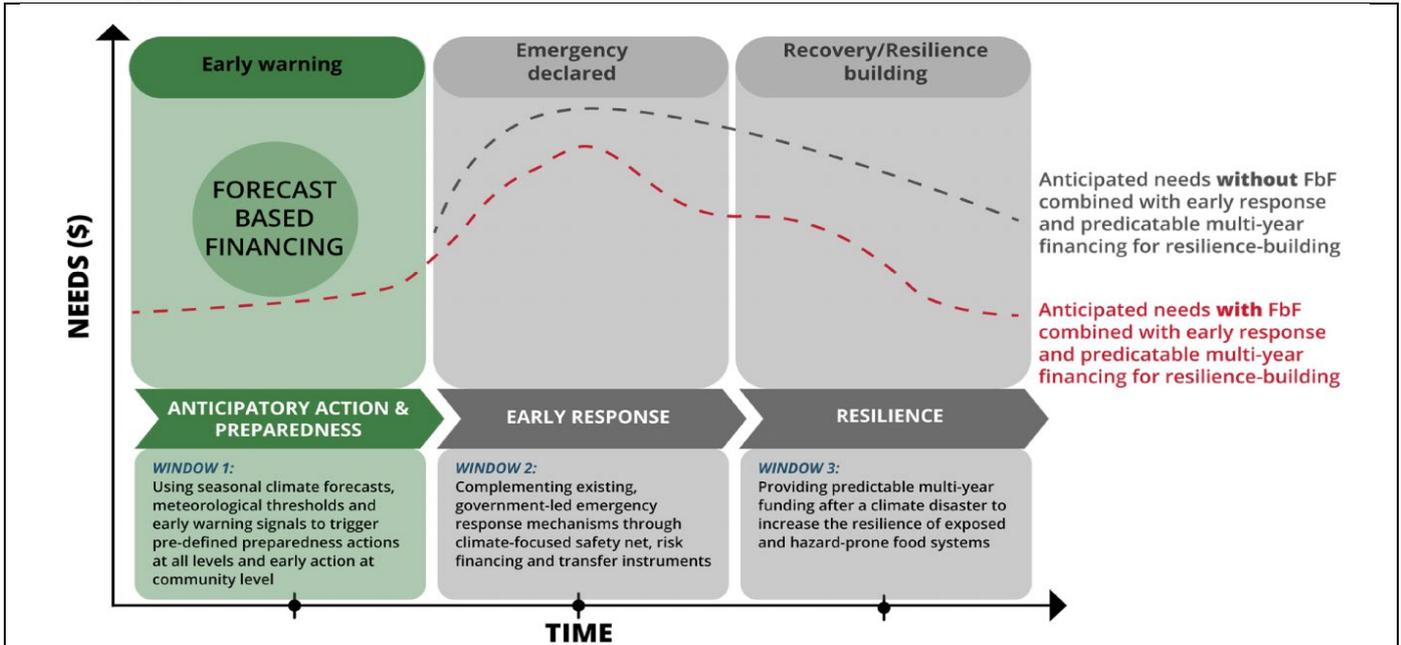


Figure B.2.6: Benefits of applying FbF mechanism

Output 4.1: Strengthened Legislation and Disaster Management Framework

Activity 4.1.1: Developing and updating legislations in order to transform LMS and LHS into a single semi-autonomous agency – This activity will support the formulation of legislation to transform LMS and LHS into a single semi-autonomous government agency called the Liberia Meteorological and Hydrological Service (LMHS). It will also facilitate regular meetings with policymakers to inform them of LMHS activities and plans as well as demonstrate the relevance of their services to socio-economic development.

Activity 4.1.2: Strengthening Liberia’s Disaster Management Framework – This activity will support the development guidelines to govern DRM in Liberia and to benchmark the checklist on Law and Disaster Preparedness and Response. The activity will also organise a national workshop with key stakeholders to share the findings of the mapping and design a roadmap to implement the recommendations. Also, it will provide technical support in the revision of a Disaster Risk management instrument.

Output 4.2 Risk scenarios developed and outreach strategies designed for stakeholders at all level

Activity 4.2.1: Delivering on early actions, consultations and roadmaps – Task under this activity will facilitate collaborate between NDMA, LMS, LHS and LNRCS to develop Standard Operating Procedures for early actions. Other tasks include the completion of a scoping study, consultations on FbF and a national dialogue and development of FbF Roadmaps.

The activity will also ensure early actions are implemented at all levels following the forecast and in the case of trigger of red alert.

Activity 4.2.2: Dialogue, peer to peer learning, capacity building and pilot testing – This activity will build capacity in terms of FbF, facilitate high-level dialogues, and support pilot testing and implementation of early actions for identified hazards. It will also facilitate peer to peer learning. The Peer to peer learning will entail the LNRCS and selected stakeholders visiting another African National Society that is implementing the FbF approach to learn from them, get inspiration and be able to have the host National Society in the peer exchange ‘walking’ with them through the journey of the Early Action Protocol development.

The Capacity Building sessions will target the following stakeholders: members of the CBATs, LNRCS branches, social protection staff, and NDMA who will then be expected to cascade this further (cf. the training plan shared, describing details of the training, including objectives). Please see IFRC Peer to Peer Learning work example.

Annex 19 describes the target agencies, specific themes, objectives and duration of the different capacity building sessions to be conducted under this output and other outputs.

Output 4.3 Liberian Climate Change Trust Fund established

To respond to climate change-related disasters through the FbF mechanism in Liberia requires a huge amount of financial support from the international community and donor partners. Though domestic resources are received from government treasury, private sector and individuals, these resources are, however, complementary support.

FbF is embedded in an innovative mechanism with financial instruments, which allows financial flows for pre-planned early actions that are triggered by forecasted climate-related hazards.

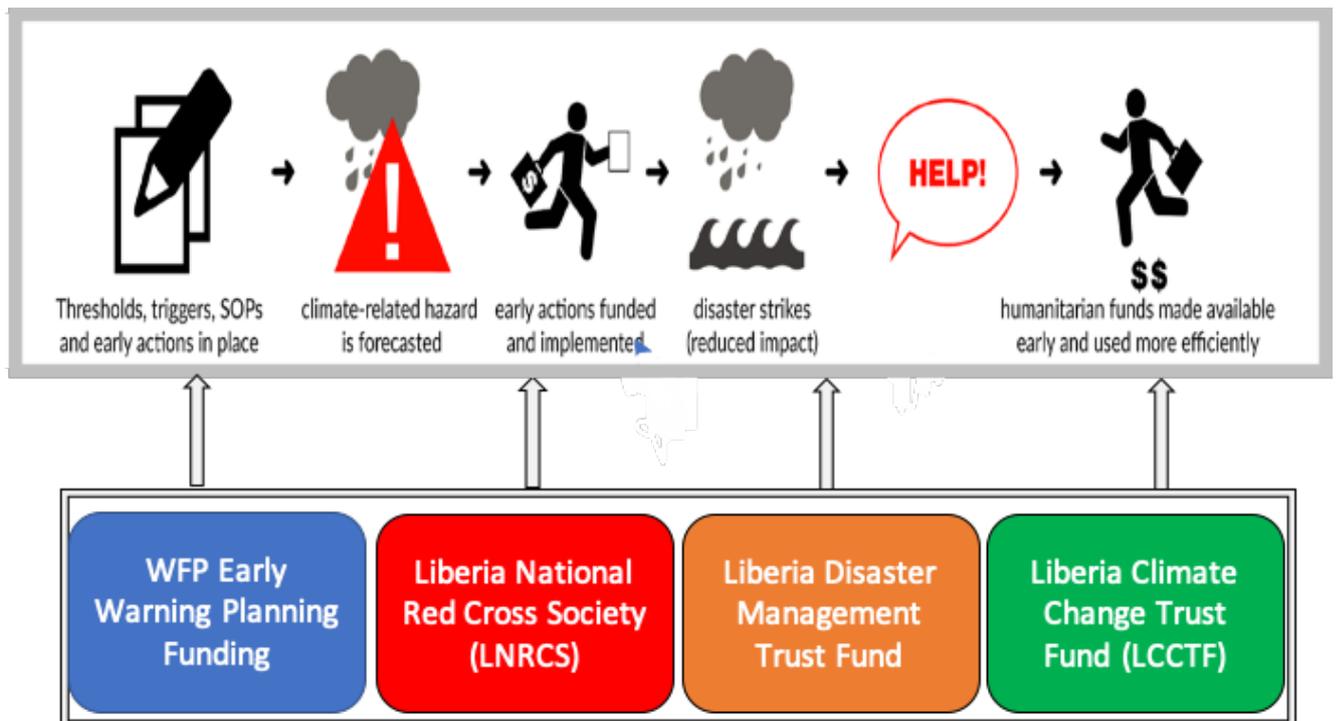


Figure B.2.7: Financial Instruments for Forecast-based Financing in Liberia.

There are two major financial instruments linked to forecast-based financing in Liberia. As indicated in Figure B.2.7, the fund allocation from WFP and the Trust Fund set up by the Government for Disaster planning. These financing instruments also support the sustainability measures identified for the funding proposal.

(a) WFP Early Warning and Planning Funding.

The WFP allocation is tied to this Component 4 of strategic intervention in Liberia on emergency preparedness and response and disaster risk management systems by 2030. The main objective is to strengthen disaster preparedness and management capacities in the country. As part of this component, the Government is working with WFP to set up funding and “ring-fence” for planning, financing and management of forecasted climate disasters that could affect food security and community livelihoods of, particularly the vulnerable population. There are transition and exit strategies planned in consultation with communities, partners, and relevant national institutions. The exit strategy includes “enhancing capacities of national and subnational institutions in the core areas of disaster management, early warning systems and information management to help with the process of progressive transfer of WFP activities to the Government. About \$3 million (representing 6%) of WFP intervention in the country are allocated for the resilience planning and management, and about \$1.8 million of that is allocated for cash transfers in case any of the forecasted climate disasters are triggered.

(b) Liberia National Red Cross Society (LNRCS)

The IFRC is currently supporting 15 countries to implement the Forecast based Financing Mechanism through technical support, coordination and learning exchanges. The Red Crescent Climate Centre (RCCC), which is established by the IFRC and the Netherlands Red Cross, is well recognised institution in climate issues. In Africa, the Centre apart from supporting the Forecast based Financing mechanism, it is supporting climate related assessments to support with policy development and advocacy, capacity building and training on climate and risk management among others. The RCCC will in September host the largest Virtual Climate meeting that will bring on board various stakeholders to challenge them to act, empower, influence and transform.

The LNRCS is set up through an Act of Liberian Parliament as an auxiliary agency and the Government of Liberia offers advisory and financial support. The LNRCS has Field Offices in all 15 counties of Liberia, and 93 Branches in the districts. LNRCS has revived the volunteer management system in the last year and now have enrolled close or 30,000 volunteers and 210 Community-based Action Teams that could be activated for emergency preparedness and response actions.

(c) *The Liberia Disaster Management Trust Fund (DMTF)*

The DMTF was established by Section 4.1 of June 2016 Act to establish the NDMA by the Government. The DMTF has two funding windows for (i) the Disaster Mitigation and (ii) Disaster Response. It is the financing mechanism established for sustainable financing of projects and programs to strengthen disaster preparedness, emergency response and mitigation towards the implementation of the Disaster Management Action Plan. The Disaster Mitigation Fund window is specifically intended for early warning and preparedness, including funding for planning and financing forecasted climate disasters that could be triggered.

The resource mobilisation efforts to capitalise the fund include (1) national annual budgetary allocation and appropriation by Legislature; (2) special levies of fees as determined by the Government; (3) revenues from taxes as determined by the Government; (4) grants and donations from natural person, body, corporate, multilateral institution, organisation or agency, or the government of any country (bilateral donors); (5) any other resources that may accrue in the course of the Agency's operation. Funds mobilised from these sources are channelled into the DMTF account with disbursements approved by the Board of Directors and signed by the Chairperson of the Board and the Executive Director of the Agency.

Activity 4.3.1. Establishment of Liberian Climate Change Trust Fund – This activity will establish the Liberia Climate Change Trust Fund (LCCTF) as a financial mechanism targeted at addressing climate change as proposed in the National Policy and Response Strategy on Climate Change document. This is will effectively promote means to finance-focused climate actions. The GoL through the National Climate Change Steering Committee (NCCSC) will be responsible for establishing this LCCTF. The GCF funding will be used to capitalize the LCCTF.

An integrated working approach will be adopted in utilizing the funds obtained so that the objectives of the national policy and response strategy are met. Furthermore, this funding approach will address the critical adaptation responses while also considering mitigation interventions in a balanced way, so that the country will gradually strengthen the green path of development. In parallel, this fund will support enabling pillars of capacity building, technology development, transfer, and the awareness-raising towards the achievement of the climate change policy and strategy objectives in Liberia. More importantly, the LCCTF will support the mobilisation of needed resources to mitigate the impact of hydromet-related hazard IBF-EWS to complement the existing financial instrument established by the WFP and the DMTF established through the Act that established the NDMA. The LCCTF will contribute to the national resource pool assigned exclusively to respond to climate-related disasters once the FbF mechanism is activated. This Fund will further be replenished with certain percentages of the cost recovery, and revenue realised from climate information services offered to end-users including large-scale commercial farmers, fishing companies, aviation sector businesses, neighbouring countries such as Sierra Leone, Guinea, and Ivory Coast.

The NCCSC will monitor the Fund by authorising the immediate release through the NDMA once warnings (red alerts) that activates the FbF mechanism is issued. Also, the hydromet sector will seek funding opportunities from the WMO Systematic Observations Financing Facility (SOFF) the support for Global Basic Observing Network (GBON).

Component 5: Co-ordinated Project Management and Implementation across all climate information service

units in Liberia

Output 5.1: Enhanced collaboration with regional organization and other African Institutions

Activity 5.1.1. *Facilitation collaboration and organizing study tours* - This activity will promote the participation of Liberia in Regional Climate Outlook Forum (RCOF). RCOFs produce consensus-based, user-relevant climate outlook products. The Fora brings together all stakeholders, including experts from the regional climate centres, NMHSs, DRR agencies as well as representatives of farmers associations, universities, research institutions and regional and international organisations engaged in climate prediction and applications, amongst other (PRESAO: Prévisions Saisonnières en Afrique de l'Ouest). The African Centre of Meteorological Application for Development (ACMAD), Niamey, Niger, coordinates the PRESAO. The latest PRESAO statement, as well as previous statements and other related climate outlook products, are available online³⁴. Also, this activity will facilitate collaboration and study tours to world-class NMHSs. This will include visits to the African Ministerial Conference on Meteorology (AMCOMET) Bureau, the continent weather centre African Centre of Meteorological Applications for Development (ACMAD), ICTP, UK Met Office, amongst others. The project will also facilitate the participation of LMS in the WMO Severe Weather Forecasting Demonstration Project (SWFDP)³⁵.

Output 5.2: A Project Management Unit (PMU) is in place and Project Supervision Achieved

This output involves the recruitment of the six key staff that will be responsible for implementation. They include the: project manager (PM), meteorology specialist, hydrology specialist, aviation specialist, communication specialist, finance officer (FO), and monitoring, and evaluation (M&E) specialist. The FO under the supervision of the PM will prepare the procurement plans of equipment and other major resources. The FO will be responsible for information regarding the procurement methodology, process, and schedule, as well as the available budget, has to be included. The plan will be updated every 18 months.

Activity 5.2.1: Recruitment of PMU staff, Preparation of the Operational manual and Project supervision – This activity will recruit six key staff that will be responsible for implementation. The operational manual will be prepared under this activity. Project supervision missions will be undertaken as part of this activity. A mid-term review will be produced. Also, a project completion mission (including supervision missions from Red Cross) will be undertaken.

Output 5.3 Monitoring, Evaluation and Learning system is established

Successful monitoring, evaluation and learning require collaborative effort across a broad range of actors including the Ministry of Finance and Development Planning (MFDP); EPA; LMS; LHS; NDMA; AfDB; GCF; direct and indirect beneficiaries; project-affected people and communities; and other local actors such as local governments, civil society organisations, non-governmental organisations and the private sector. MEL Information must flow freely between stakeholders. It is important to ensure there is a commitment to horizontally use and share information from the collection and analysis of data between the Project Management Unit (PMU), GCF and the Bank. Information should also be fluid between stakeholders. The goal is to create a transparent MEL system. The project's MEL specialist will have to coordinate activities and information to maximise the efficiency and transparency of the system.

Activity 5.3.1: Monitoring, Evaluation and Learning System – The tasks under this activity are discussed below.

Develop an MEL Plan – This activity will develop the blueprint for implementing and managing the MEL System. The document presents the methodology and tools to collect and report data on each of the results indicators included in the RMF. It defines the protocols and standard procedures to ensure that data is gathered in a technically sound manner, is consistent and can be compared throughout the years. The Plan integrates both the AfDB and the GCF reporting tools including the Annual Performance Report (APR); Implementation Progress Report (IPR); Mid-term Review Report (MTR); and Project Completion Report (PCR). The Plan specifies the role and responsibility of each actor in the system. Development of the M&E Plan should be a multi-stakeholder undertaking with input from all actors involved in implementing the plan. This approach not only contributes to enhancing harmonisation in expected impact, outcomes and outputs but also reinforces buy-in and mutual accountability from all stakeholders.

³⁴ <http://www.clivar.org/panels-and-working-groups/africa/rcofs> (Accessed 13 Feb 2020)

³⁵ <https://www.wmo.int/pages/prog/www/swfdp/> (Assessed 20 Mar 2020)

Preparing annual financial audit reports – This entails the preparation of yearly financial reports of the project.

Develop M&E Tools including Results Indicator Reference Sheet (RIRS), and Results Indicator Tracking Matrix (RITM) - The RIRS provides a precise definition for each results indicator; specifies the unit of measurement; outlines the data collection methodology (administrative reports, surveys, interviews, focus groups, etc.); indicates the person responsible for data collection and management; prescribes the format for data management (database, spreadsheets, etc.); explains data limitations and mitigation measures; and indicates the reporting schedule. The PMU should be using the same indicator language, definitions and data collection methodologies as specified in the M&E Plan. The RITM is a spreadsheet that provides a global view of progress achieved for each indicator. It includes the indicator, the baseline, the target, and the achievement for the reporting period (semester or annual depending on the indicator). The data for each indicator has to be disaggregated as prescribed in the RIRS.

Undertake a baseline analysis: This activity will collect the baseline data for each of the output indicators during the first year of implementation.

Procure MEL software – – This activity will procure and install a MEL software to facilitate the collection, analysis, and management of data. MEL software can make it easy for users to aggregate and visualise data and spot trends. Other features include decision support platforms, work program and budget tracking tools and collaborative work environments.

Undertake Data Quality Assessment (DQA) –The activity will evaluate the quality of data sources, systems, procedures, tools, and collection methodology, using the following five criteria:

1. **VALIDITY:** The data should clearly and adequately represent the intended result
2. **INTEGRITY:** The data should have safeguards to minimise the risk of transcription error or data manipulation
3. **PRECISION:** The data should have a sufficient level of detail to permit management decision-making
4. **RELIABILITY:** The data should reflect consistent collection processes and analysis methods over time
5. **TIMELINESS:** Data should be available at a useful frequency, be current, and timely enough to influence management decision-making.)

A formal DQA for all indicators should be conducted every two years. Notwithstanding, the PMU should also have quality procedures in place to ensure that data standards are respected during the entire life of the project.

Provide MEL training – This activity will ensure that high standards are maintained, and activities are consistent with best practices in the field. Specialised training will be provided to the M&E specialist, project manager and other members of the project team.

Activity 5.3.2: Impact evaluation – This activity will involve the following:

Conduct an impact evaluation assessment of the project— Impact evaluation is an assessment of how the intervention being evaluated affects outcomes, whether these effects are intended or unintended. According to the Organization for Economic Development, the proper analysis of impact requires a counterfactual of what those outcomes would have been in the absence of the intervention. A World Bank study was able to successfully conclude project performance is better where an impact evaluation accompanies projects. The project will be recommended to the Learning Oriented Real-Time Impact Assessment (LORTA) programme. LORTA, which is implemented by the GCF’s Independent Evaluation Unit (IEU), provides real-time measurement and learning through theory-based impact measurement using experimental and quasi-experimental methods. It supports the project in designing high-quality data sets that provide real-time information on the effectiveness of implementation and the likelihood of achieving results. LORTA adds value by embedding real-time measurement to determine the causal change that may be attributed to GCF investments. Funding will be included to ensure that an impact evaluation of the project occurs even if the project is not selected for the LORTA program; and

Prepare donor reports - This activity will ensure that the project produces donor required reports including the APR, IPR, MTR, PCR as well as other periodic reports such as quarterly technical and financial reports on time.

The Theory of Change (ToC) for the intervention explains the process of change by outlining causal linkages in the between output, outcomes, and overall project goal. The identified changes are mapped as a set of interrelated pathways, with each pathway showing the expected outcomes in a logical relation to the others, as well as chronological flow. The underlying assumptions, as well as the risk and mitigating actions, are highlighted. The theory of change for the project is illustrated in Figure B.2.8.

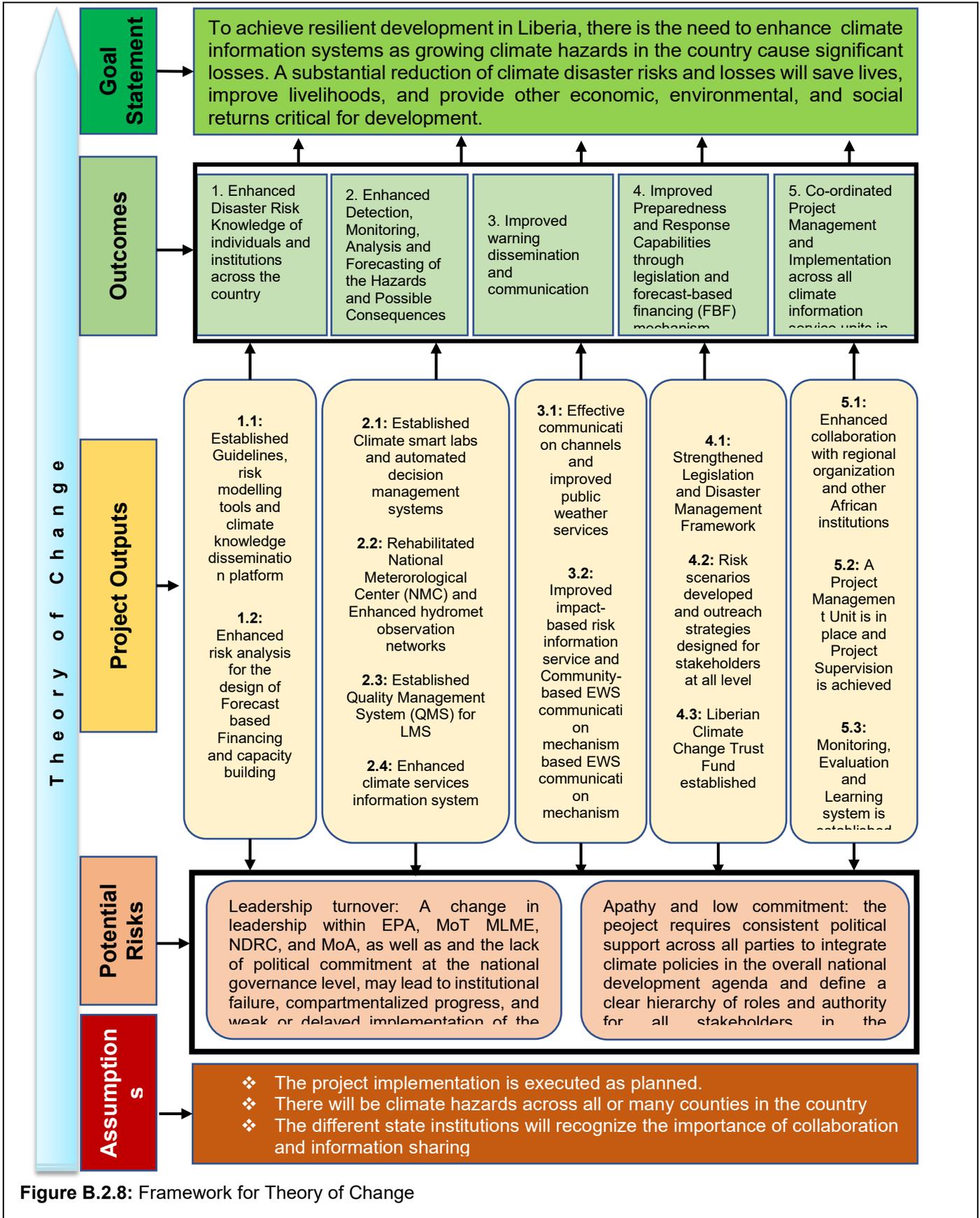


Figure B.2.8: Framework for Theory of Change

B.3. Implementation / institutional arrangements (max. 750 words)

Description of the project implementation structure, outlining legal, contractual and institutional arrangements and the structure between the GCF, the Accredited Entity (AE) and/or the Executing Entity (EE) or any third parties (if applicable) and beneficiaries. Provide a diagram that maps such arrangements and governance structures.

Components	Output	Activities	Responsible	Accountable	Consulted	Informed	
Component1: Enhanced Disaster Risk Knowledge of individuals and institutions across the country	Output 1.1: Established Guidelines, risk modeling tools and climate knowledge dissemination platform	Activity 1.1.1: Establishment of Guidelines and risk modelling tools	EPA	EPA, LMA, LHS, NDMA	LMS, LHS	AfDB, NCCSC	
		Activity 1.1.2: Establishment of internet based geospatial platform	EPA	EPA, LMA, LHS, NDMA	MGCSF MOH, WMO	AfDB, NCCSC	
	Output 1.2: Enhanced risk analysis for the design of Forecast based Financing and capacity building	Activity 1.2.1: climate hazards assessments, communities consultations and national database	EPA	IFRC INRCS RCRCCC	MGCSF, MoH, WMO	AfDB, NCCSC	
		Activity 1.2.2: Community based actions and capacity building	EPA	LMHS, WMO	MGCSF MoH	AfDB Districts	
Component2: Enhanced Detection, Monitoring, Analysis and Forecasting of the Hazards and Possible Consequences	Output 2.1: Established Climate smart labs and automated decision management systems	Activity 2.1.1: Development and Operationalization of an automated decision management system for climate services	EPA	EPA, LMA, LHS, NDMA	MOD, MOA, MOT, MoH/CHT	AfDB, NCCSC	
		Activity 2.1.2: Establishment of Meteorological and Hydrological lab with LMS and LHS	EPA	EPA, LMA, LHS, NDMA	MOD, MOA, MOT, MoH/CHT	AfDB, NCCSC	
		Activity 2.1.3 : Strengthening environmental monitoring lab and enhancing NDMA emergency operations	EPA	EPA, LMA, LHS, NDMA	MOD, MOA, MOT, MoH/CHT	AfDB, NCCSC	
		Activity 2.1.4: Installing solar systems for sustainable and uninterrupted power supply	EPA	EPA, LMA, LHS, NDMA		AfDB, NCCSC	
	Output 2.2: Rehabilitated National Meteorological Center (NMC) and Enhanced hydromet observation networks	Activity 2.2.1: NMC Rehabilitation	EPA		LMA, NMC, LHS, NDMA	AfDB, NCCSC	
		Activity 2.2.2: Enhancing the Hydrometeorological observation networks	EPA	EPA, LMA, LHS, NDMA	RIA	AfDB, NCCSC	
	Output 2.3 Established Quality Management System (QMS) for LMS	Activity 2.3.1: Developing good understanding of QMS, gap analysis and workplan	EPA	LMA, LHS	NDMA	AfDB, NCCSC	
		Activity 2.3.2: QMS Policy Development and policy related training	EPA	LMA, LHS	MOD, MOA, MOT, MoH/CHT	AfDB, NCCSC	
		Activity 2.3.3: QMS ISO 9001 Certification	EPA	LMA, LHS		AfDB, NCCSC	
	Output 2.4: Enhanced climate services information system	Activity 2.4.1: Establishing an E-infrastructure for weather and seasonal forecasting with support system	EPA	ICTP		AfDB, NCCSC	
		Activity 2.4.2: Establishment of Communities of Practice	EPA	EPA, LMA, LHS, NDMA	MOH, WMO	AfDB, WFP Districts	
		Activity 2.4.3: Production of seasonal forecasts and related trainings	EPA	LMA, LHS	MIA	AfDB, NCCSC	
Component3: Improved warning dissemination and communication	Output 3.1: Effective communication channels and improved public weather services	Activity 3.1.1: Trainings, surveys, engineering assistance and impact evaluation of dissemination measures	EPA		ICTP	AfDB, NCCSC	
		Activity 3.1.2: Establishment of Public Weather Service studio	EPA	EPA, LMA, LHS, NDMA		AfDB, NCCSC	
	Output 3.2: Improved impact-based risk information service and Community-based EWS communication mechanism	Activity 3.2.1: Delivering improved impact based risk information service	EPA	IFRC INRCS RCRCCC		AfDB, NCCSC	
		Activity 3.2.2: Establishing community-based EWS communication mechanism	EPA	IFRC INRCS RCRCCC	MGCSF MOH, WMO	AfDB Districts	
Component4: Improved Preparedness and Response Capabilities through legislation and forecast-based financing (FBF) mechanism	Output 4.1: Strengthened Legislation and Disaster Management Framework	Activity 4.1.1: Developing and updating legislations in order to transform LMS and LHS into a single semi-autonomous agency	EPA	EPA, LMA, LHS, NDMA	MIA	AfDB, NCCSC	
		Activity 4.1.2: Strengthening Liberia's Disaster Management Framework	EPA	EPA, LMA, LHS, NDMA		AfDB, NCCSC	
	Output 4.2 Risk scenarios developed and outreach strategies designed for stakeholders at all level	Activity 4.2.1 : Delivering on early actions, consultations and roadmaps	EPA		WFP	Districts, NDMA	AfDB, NCCSC
		Activity 4.2.2: Dialogue, peer to peer learning, capacity building and pilot testing	EPA		WFP		AfDB, NCCSC
Output 4.3 Liberian Climate Change Trust Fund established	Activity 4.3.1 : Establishment of Liberian Climate Change Trust Fund	EPA	EPA, LMA, LHS, NDMA	MoF	AfDB, NCCSC		
Component5: Co-ordinated Project Management and Implementation across all climate information service units in Liberia	Output 5.1: Enhanced collaboration with regional organization and other African Institutions	Activity 5.1.1: Facilitation collaboration and organizing study tours	EPA	EPA, LMA, LHS, NDMA		AfDB, NCCSC	
	Output 5.2: A Project Management Unit is in place and Project Supervision is achieved	Activity 5.2.1: Recruitment of PMU staff, Preparation of the Operational manual and Project supervision	EPA	EPA, LMA, LHS, NDMA	AfDB, MGCSF, MOH, WMO	IFRC INRCS RCRCCC	
		Activity 5.3.1: Monitoring, Evaluation and Learning System	EPA	EPA, LMA, LHS, NDMA	MGCSF	AfDB, NCCSC	
Output 5.3 Monitoring, Evaluation and Learning system is established	Activity 5.3.2: Impact Evaluation	EPA	EPA, LMA, LHS, NDMA	MGCSF	AfDB, NCCSC		
NDMA: National Disaster Management Agency		MoA: Ministry of Agriculture					
LMS: Liberia Meteorological Service		LMA: Liberia Meteorological Agency					
LHS: Liberia Hydrological Service		RCRCCC: Red Cross Red Crescent Climate Change					
EPA: Environmental Protection Agency		NCCSC: National Climate Change Steering Committee					
MoT: Ministry of Transport		MGCSF: Ministry of Gender, Children and Social Protection					
NCCS: National Climate Change Secretariat		MoH/CHT: Ministry of Health /County Health Team					
RIA: Roberts International Airport		MIA: Ministry of Internal Affairs					
MOD: Ministry of Defense							

Table B.3.1 Implementation Structure with RACI Matrix.

Table B.3.1 presents the structure of the implementation with key roles for the AE, EE and implementing partners in a Raci matrix. The AfDB through Climate Change and Green Growth Department (PECG) and the ClimDev-Africa Special Fund (CDSF) have vast experience in managing Climate Change projects. The AfDB will sign a Subsidiary Agreement (SA) with the MFDP on behalf of the Government of Liberia and the EPA of Liberia. MFDP will represent the government to sign the grant agreement and transfer the funds on behalf of the GOL to EPA. As indicated in Table 3.1 the MFDP is not responsible for any activity other than transferring the funds to EPA. The EPA is the Executing Entities of this project.

The AFDB, which the AE, will carry out this project and apply the experiences it has gained in implementing various loans and multilateral/bilateral grants. The AFDB has vast experience in managing Climate Change projects, and over the last three years, it has implemented climate change projects worth over 3 million dollars in Liberia.

According to the Accreditation Master Agreement, the African Development Bank will enter into a Funded Activity Agreement with the Green Climate Fund. Additionally, AFDB will carry out the project by signing a Subsidiary Agreement with the government of Liberia, represented by the EPA of Liberia.

AFDB shall oversee, supervise, manage and monitor the GCF approved project. AFDB technical and fiduciary teams shall conduct supervisory mission at least twice a year during the implementation period to ensure that the implementation of the project is in accordance with the legal agreements between the Bank and the GCF; and between the Bank and EE. In addition, the Bank shall provide constant advice and guidance to the entities that will implement the project in terms of technical aspects, fiduciary requirements, environmental & social aspects, and monitoring & evaluation.

EPA as the Executing Entity, will head a Project Implementing Unit (PIU). The PIU will coordinate the implementation of the project, and will consist of three technical departments (Liberia Meteorological Service, Liberia Hydrological Service and National Disaster Management Agency), Project Manager and Project Staff. The role of the three technical department is to provide technical support to the PIU.

Other institutions/ agencies in the project which will support EPA to implement the project i.e. IFRC (including LNRCS and the Climate Centre), will be known as “Responsible Parties. IFRC will sign Memorandum of Understanding (MoU) with EPA. EPA will review and monitor their work & financial plan, procurement plan, M&E plan, among others.

The IFRC, LNRCS and the Red Cross Red Crescent Climate Centre will develop the impact based forecasting methodology for Forecast based Financing as well as ensuring that the last mile is reached through designing activities that address the needs of those at most risk of the climate hazards. They will support the establishment of community early warning systems, promote their connection to national early warning systems and enable an effective forecast-based financing (FbF) mechanism, to ensure climate-informed decision-making, planning, and response by and for the communities most at-risk from climate shocks and extreme weather events.

The National Climate Change Steering Committee (NCCSC) will be responsible for project oversight at the national level. NCCSC will consists of representatives from all collaborating government and international institutions. At the level of NCCSC, there will be a quarterly inter-ministerial meeting to discuss the progress of the project and other climate-related issues.

A Vulnerability and Adaptation Expert Working Group will be constituted. This inter-sectoral working group consisting of personnel from LHS, LMS, MoT, NDMA, LCAA, MOA, Ministry of Gender, Children and Social Protection (MGCSP), MoH, and WMO will convene monthly to discuss progress and implementation-related issues.

The project will establish a climate-smart Labs for the hydromet service producers. The Labs will provide vital products on hydrology, meteorology, aviation, disaster risk reduction, and M&E. Also, the Labs will help to facilitate effective delivery of weather, water, and climate products and other relevant environmental services. The information generated will be communicated via the most effective and efficient channel to the county, district and community levels through their respective coordination and engagement structures (i.e. committees). The information will also be shared with the international collaborating partners including the IFRC, WMO, and others working on climate adaptation and disaster response such as the USAID and the UNDP.

At the county level, the working group membership is comprised of county level representation from Ministry of Agriculture (MOA), Ministry of Transport (MOT), National Disaster Management Agency (NDMA), Environmental Protection Agency (EPA), Ministry of Health County Health Team (MoH/CHT), Ministry of Internal Affairs (MIA), Ministry of Gender, Children and Social Protection (MGCSP), Ministry of Defense (MOD), Fire Service, IFRC/LNRCS and NGOs. The county workgroup is responsible for the dissemination of the information received in a timely manner to the district level working groups and onward to the communities, where the information can be used to make evidence-based decision-making.

The district-level working group comprises district officers from MOA, MGCSP, EPA, MoH, MIA, NDMA, LNRCS and community-based organizations such as farmer cooperatives. At community level, local structure including leadership and engagement modalities such as town-hall/community meetings will be utilized. Community actors such as community chair, women and youth, persons with disabilities, development committees, farmer cooperatives are very essential. The project implementation arrangement is presented in Figure B.3.1.

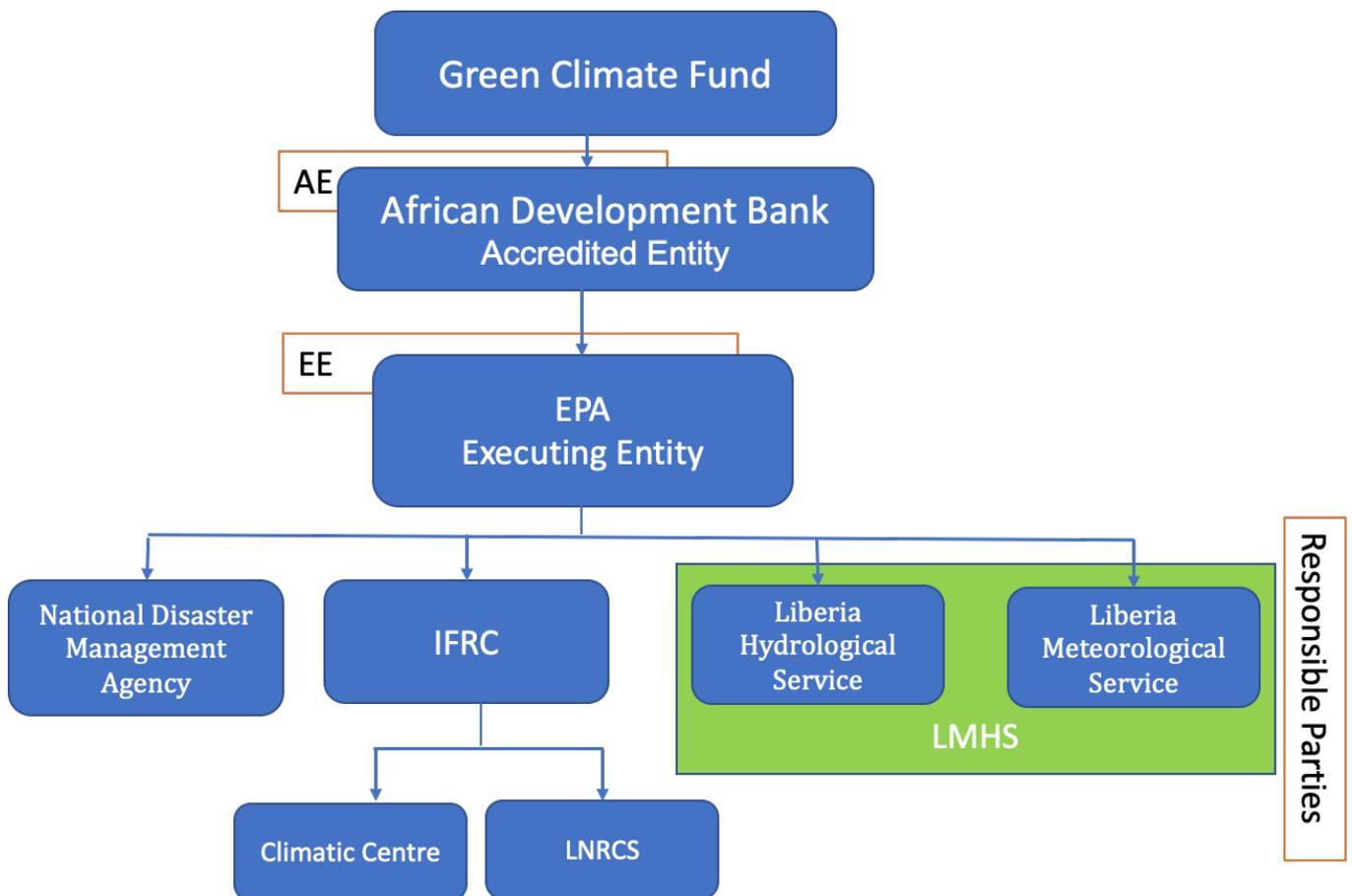


Figure B.3.1: Project implementation arrangement

Implementation of the proposed LCCTF

The LCCTF proposed under Output 4.3 will be setup by the GoL as stated in the National Policy and Response Strategy on Climate Change document. The fund requested from GCF will be used to initially capitalize the Trust Fund. This Fund will be used to effectively promote means to finance-focused climate actions and to address the critical adaptation responses while also considering mitigation interventions in a balanced way that will strengthen the green path of development. The LCCTF will contribute to the national resource pool assigned exclusively to respond to climate-related disasters such as the FbF mechanism, which will be implemented by the NDMA in collaboration with the LNRCS and IFRC. The LCCTF will be replenished with certain percentages of the cost

recovery and revenue realised from climate information services paid for by corporate organizations and end-users including large-scale commercial farmers, fishing companies, aviation sector businesses, neighbouring countries such as Sierra Leone, Guinea, and Ivory Coast.

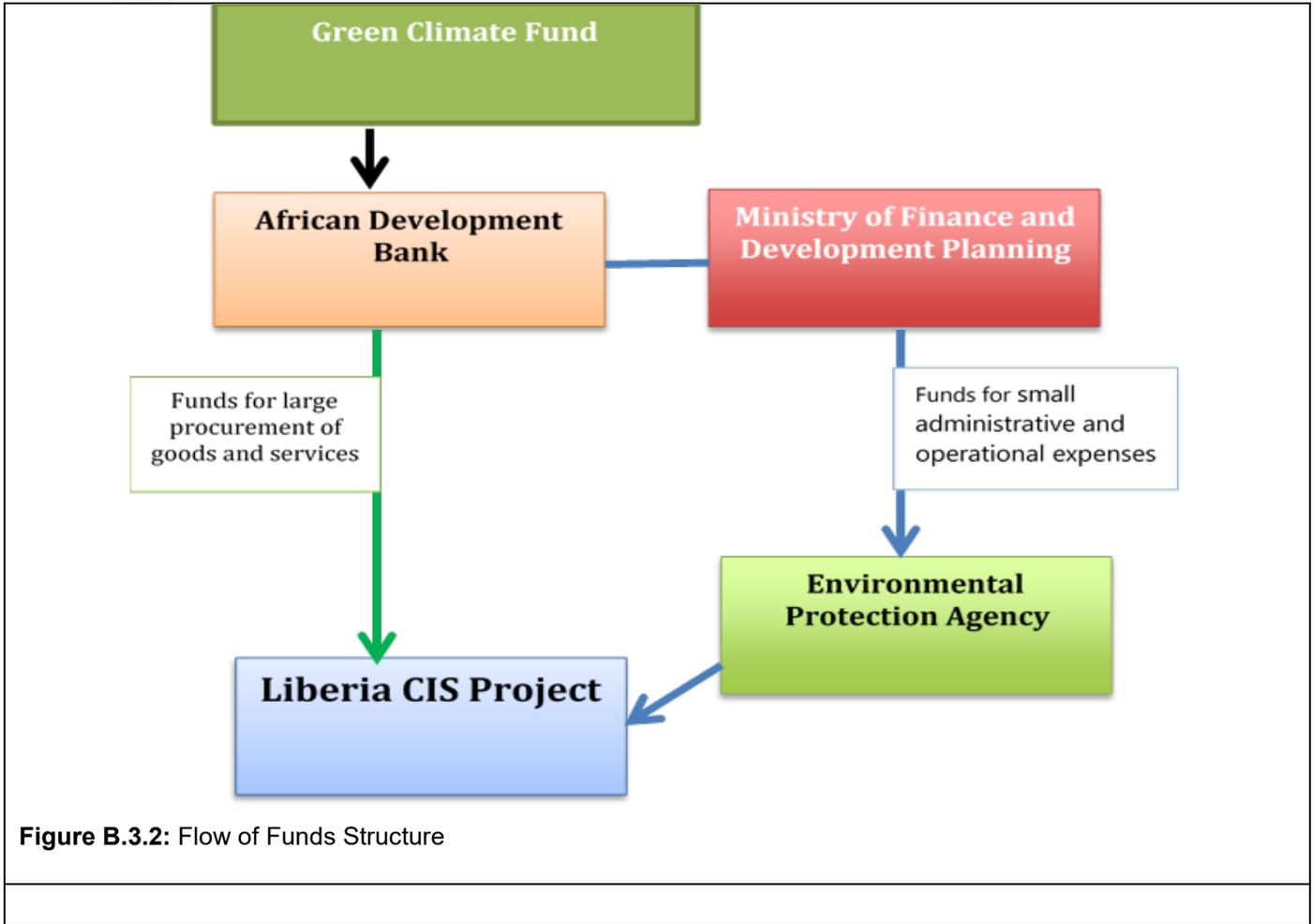
The Government of Liberia will manage the project through the Environmental Protection Agency, an executing entity. Under the technical guidance of the EPA and Expert Working Groups, the PMU will be responsible for the overall execution of the project, the timely completion of project activities, financial oversight, and the attainment of expected results.

Information and an organogram on the financial flows between the AE and the EE(s) and the financial flows in the context of AfDB accreditation parameters (e.g., specialised fiduciary function).

The GCF will transfer through the Trustee non-reimbursable funds of US\$10,000,000 to the AfDB's GCF account the execution and effectiveness of the Funded Activity Agreement ("FAA"), meeting necessary condition(s) and submitting the required documentations for disbursement. The AfDB will then sign a grant agreement ("Grant Agreement") with the Ministry of Finance and Development Planning (MFDP) on behalf of the Government of Liberia (GoL). AfDB will create a special account for GCF proceeds to undertake this funded activity as approved by the GCF Board. Disbursement of the proceeds for the project will be done according to the terms and conditions of the FAA and the grant agreement as well as provisions of the Disbursement Handbook in force at the AfDB. The disbursement methods that will be used are as follows (a) the special account method (for operating expenses, payment of project staff, certain workshop related expenses) and (b) the direct payment method for the payment of works, goods and service contracts.

The MFDP and the EPA will open a Special account for the management of the project's administrative expenses for small purchases such office suppliers, payment for project staff, and expenses for supervision, monitoring and reporting. There will be a minimum of three signatories for checks and withdrawals for small administrative expenses. Large procurements such as the acquisition of automatic weather stations will be made directly by the AfDB to suppliers and service providers upon submission of relevant completion documents. Procurement will follow AfDB procurement procedures. The Project Steering Committee will oversee the utilisation of funds with clear memorandum of understandings (MoUs) between the EPA as EE and the implementing partners.

For the special account to cover operating and administrative expenses, a Liberian dollar-denominated special account under the responsibility of EPA will be opened at a local bank deemed acceptable to the AfDB. All supporting documentation for project expenditures (all funding combined) will be filed and maintained in a secure location and accordance with the Law. These supporting documents must be available and accessible for review/audit by periodic AfDB supervision missions, external audits, and internal audits. AfDB, in its role as the AE, has overall responsibility and oversight for the project in line with its Accreditation Master Agreement.



C. FINANCING INFORMATION					
C.1. Total financing					
(a) Requested GCF funding (i + ii + iii + iv + v + vi)		US\$ 10,000,000.00		Options	
GCF Financial Instrument		Amount	Currency	Tenor	Pricing
(i)	Senior loans	0	-	-	0 %
(ii)	Subordinated loans	0	-	-	0 %
(iii)	Equity	0	-	-	0 % equity return
(iv)	Guarantees	0	-	-	0 %
(v)	Reimbursable grants	0	-	-	-
(vi)	Grants	10,000,000	US\$	5	-
		Total amount		Currency	

(b) Co-financing information ³⁶	US\$ 1,000,000			USD		
Name of institution	Financial instrument	Amount	Currency	Tenor	Pricing	Seniority
Government of Liberia (GoL).	In kind	1,000,000.00	USD	5	0%	Options
African Development Bank	Grant	431,969.00	USD	5	0%	
(c) Total investment = (a)+(b)	Amount			Currency		
	US\$ 11,431,969.00			USD		
(d) Co-financing ratio (d) = (b)/(a)	0.125					
(e) Other financing arrangements for the project/programme (max ½ page)	Please explain if any of the financing parties, including the AE, would benefit from any type of guarantee, e.g., sovereign guarantee, MIGA guarantee, etc. Information on legal, due diligence (taxes, insurance, etc.) shall be reported in Annex 10.					

C.2. Financing by component

Please provide an estimate of the cost per component (as outlined in Section B.2. above) and disaggregate by sources of financing. This table should match the one presented in the term sheet, and the names (in the rows) should match those presented in the logic framework in section D below.

Component	Output	Indicative cost (USD)	GCF financing		Co-financing of EUR400,000/US\$431,969 from AfDB is included as co-financing to complement that of GoL.					
			Amount (USD)	Financial Instrument	Amount (USD)	Financial Instrument	Name of Institutions	Amount (USD)	Financial Instrument	Name of Institutions
Component 1: Enhanced Disaster Risk Knowledge of individuals and institutions across the country	Output 1.1: Established Guidelines, risk modelling tools and climate knowledge dissemination platform	352,500	589,500	Grants	0		GoL	0	-	AfDB

³⁶If the co-financing is provided in different currency other than the GCF requested, please provide detailed financing information and a converted figure in the GCF requested currency in the comment box. Please refer to the date when the currency conversion was performed and the reference source.

	Output 1.2: Enhanced risk analysis for the design of Forecast based Financing and capacity building	237,000								
Component 2: Enhanced Detection, Monitoring, Analysis and Forecasting of the Hazards and Possible Consequences	Output 2.1: Established Climate smart labs and automated decision management systems	2,285,997	5,198,997	Grants	0		GoL	292,000	Grants	Af DB
	Output 2.2: Rehabilitated National Meteorological Center (NMC) and Enhanced hydromet observation networks	2,383,500								
	Output 2.3 Established Quality Management System (QMS) for LMS	305,000								
	Output 2.4: Enhanced climate services information system	516,500								
Component 3: Improved warning dissemination and communication	Output 3.1: Effective communication channels and improved public weather services	887,665	1,617,835	Grants	0		GoL	79,469	Grants	Af DB
	Output 3.2: Improved impact-based risk information service and Community-based EWS communication mechanism	809,639								

Component 4: Improved Preparedness and Response Capabilities through legislation and forecast-based financing (FBF) mechanism	Output 4.1: Strengthened Legislation and Disaster Management Framework	251,500	1,921,268	Grants	0		GoL	0	Grants	Af DB
	Output 4.2 Risk scenarios developed and outreach strategies designed for stakeholders at all level	669,768								
	Output 4.3 Liberian Climate Change Trust Fund established	1,000,000								
Component 5: Co-ordinated Project management and implementation across all climate information service units in Liberia	Output 5.1: Enhanced collaboration with regional organization and other African Institutions	140,000	372,400	Grants	700,000		GoL	10,500	Grants	Af DB
	Output 5.2: A Project Management Unit (PMU) is in place and Project Supervision Achieved	9,000								
	Output 5.3 Monitoring, Evaluation and Learning system is established	933,900								
	PMC	650,000	300,000	Grants	300,000		GoL	50,000	Grants	Af DB
Indicative total cost (USD)		US\$ 11,431,969.00	US\$ 10,000,000.00	US\$ 1,000,000.00		US\$ 431,969.00				

C.2.1 Financing structure (if applicable, mandatory for private sector proposal (max.300 words))

For private sector proposals, provide an overview (diagram) of the proposed financing structure. Please note that this section should focus on describing what is being paid for, either by GCF funding and/or co-financing.

N/A

C.3 Capacity Building and Technology development/transfer

If the project/programme is envisaged to support capacity building and technology development/transfer, please specify the total requested GCF amount for these activities, respectively, in this section.

C.3.1 Capacity building | Amount: USD 2,554,000

C.3.2. Technology development	Amount: USD 6,169,227
C.4. Justification for GCF funding request (max. 500 words)	
<p><i>Provide information why GCF is the appropriate donor for the proposed project/programme.</i></p> <p>GCF was established to finance programs and projects for climate change adaptation and/or mitigation. With its huge potential to spark a paradigm shift towards resilient and low-carbon sustainable development, the project proposed captures the essence of the GCF mission and mandate. By supporting this project, the GCF will contribute towards increasing resilience and enhancing livelihoods of the most vulnerable people and communities, enhancing food and water security, as well as strengthening the resilience of infrastructure and built environment, destroyed by over 14 years of civil war. GCF financing will, therefore, make a real contribution to the resources needs for meteorological and hydrological services to guide national planning in priority areas such as agriculture and food security, health, water resources, disaster risk reduction, energy, and transportation</p> <p>Moreover, DRR is not only a high priority adaptation action area for Liberia; it also has great potential for widespread cross-sectoral impact. GCF involvement in the project is critical as it will contribute towards strengthened resilience of people and community infrastructure and built environment to the impacts of climate variability and change and related risks. Without GCF investments, the project activities will not be implemented.</p> <p>The project will also contribute to the achievement of Liberia’s commitments to the UNFCCC conventions—specifically, the NDCs as the National Adaptation Plans (NAPs), National Adaptation Programmes of Action (NAPA), and the national climate change national disaster risk management strategies. Linking project interventions to the NDC will align investments with national climate goals and mainstream climate infrastructure needs into broader growth plans. By reducing economic losses, improving health, increasing food and water security as well as strengthening climate information services for effective planning, the CIS project will directly support climate-resilient development in Liberia.</p> <p><i>Describe the challenges to access finance (public and private). Also, describe the financial gaps and barriers that the proposed project/programme is expected to fill and address in the absence of any other financing. In your answer, please consider the risk-sharing structure between the public and private sectors, the barriers to investment, and the indebtedness of the recipient (if applicable).</i></p> <p>Private sector financing, including concessional financing, is challenging given the limited revenue generation potential and cost-recovery opportunities. Moreover, the public goods nature of these investments means that public financing is required to overcome the barriers that constrain Liberia’s ability to scale up the use of early warning systems and climate information services.</p> <p>Gaps in domestic financing are hampering Liberia’s ability to implement adaptation measures and overcome these barriers. Without GCF resources, Liberia will continue to experience loss of lives and assets due to climate-related disasters.</p> <p>Continuing the early warning system, which includes maintenance and upgrade of the existing system, building technical capacity and coordination is expensive and very demanding in terms of human resources and supporting infrastructure. A sustainability model suggesting a public-private partnership requires the Government of Liberia to fully develop and lease to a private entity to operate and provide maintenance under specified terms. Terms and conditions will be determined by the Government and will consider learning, skills transfer, maintenance, upgrades, and duration.</p>	
C.5. Exit strategy and sustainability (max. 300 words)	
<p><i>Sustainability of the project after GCF exits the project. Elements that will guarantee the sustainability of the investment, including essential information on the operation and maintenance of the activities in the post-implementation phase (e.g., key infrastructure, assets, contractual arrangements). As well as the GCF’s financial exit strategy in case of the private sector (through Initial Public offerings, trade sales, etc.).</i></p> <p>By the end of the GCF project, LMS, LHS, EPA, NDMA will be institutionally, technically, and technologically equipped and trained to collect weather and climate data. The agencies will be able to introduce and maintain</p>	

modelling, forecasting, and early warning systems to scale-up evidence-based climate-informed decision-making, planning, and response actions countrywide.

The project outcomes align with the priorities of Liberia Country Strategic Plan (2019-2023), which seeks to integrate green growth, environmental resilience, and adaptation into national development planning through effective climate information systems. The outcomes are also consistent with the goals of Liberia's National Vision 2030, which aims to reduce poverty, promote social-economic development, and reduce the impact of weather and climate-related disasters in the country. The project will contribute to the efforts of the Government of Liberia to both reduce the vulnerability of its population to weather and climate risk and to ensure the sustainable development of the country. It will also strengthen the hydro-meteorological sector's ability to contribute to the objectives of Liberia's National Development Plan.

The participating departments—EPA, LMS, LHS, and NDMA, which continue to receive support from the government—will fully integrate project activities into their budgets. The agencies receive annual funding through the Government of Liberia annual budget allocation. The funding include the payment of expenses related to the operation and maintenance costs for the meteorological and hydrological monitoring and data management equipment. The budgets also support activities related to weather and climate monitoring, forecasting, and warning, flood monitoring, and research and development on atmospheric, geophysical, astronomical, allied sciences, and general administration operations. Every year, the government allocates the four institutions Environmental Protection Agency; Ministry of Transport; National Disaster Management Agency; and Ministry of Mines & Energy a total of 5.3 million US dollars and 1.5 million US dollars for staff compensations; and operation and maintenance of equipment, respectively (see Annex 20 for details on Government of Liberia projected support to the four institutions up to the year 2022). In addition, the Liberia Airport Authority has confirmed that it will meet the operation and maintenance costs of the installed radar and automatic weather stations installed at the airport (see Annex 21). Also, the LMS and LHS typically install weather, climate, and hydrological observing and monitoring equipment on their designated weather and hydrological observing stations (e.g., synoptic, agromet, etc.) strategically located across the country. This helps ensure the security and continuous operations of the facilities and equipment.

The LMS will procure and install AWS during the first year of implementation. The estimated total unit cost is 10,000 US dollars, including installation works. The land requirement for AWS and tide stations are 36 m² and 9 m² respectively. A typical synoptic station has a lot of area of at least 500 m². The project will install AWS' in local government-owned properties such as state universities etc. A MoU will be executed between LMS/LHS and the concerned local governments and institutions to ensure the security and continuous operations of the facilities. The MoU will include a clause related to the local population's agreement to keep watch over the installed equipment, thereby ensuring a sense of ownership of the system on the part of the local communities. Notwithstanding, the LMS/LHS will still regularly check and maintain the system.

Both the LMS/LHS have learned lessons when it comes to protecting their investments in equipment and facilities, which they will leverage to ensure the sustainability of the current project. One significant lesson is that the installation of AWS on mobile phone towers and ground stations, as was done in a previous project, is not suitable for METAR or SYNOP reports (report of surface observation from a land station – code form) – the tower affects the wind speed, direction, temperature, and rainfall. This approach also incurs unnecessary costs for the LMS.

The AfDB through its CDSF is launching a 400,000 Euros project earmarked to improve the weather and climate observation network, build the capacity of LMS to produce and deliver weather services, and provide weather forecasts and warnings to the public and other users. There are plans to purchase and install various climate observation equipment for the LMS. To increase the sustainability of this equipment, the AfDB will ensure that the quality of after-sales services of the supplier is part of the selection criteria for the provider. The project will also support LMS in procuring a four-wheel vehicle fitted with a calibration unit to monitor the operation and conduct regular maintenance of all equipment and facilities the department has installed around the country. Lastly, LMS will make it its policy that only well-trained and approved specialists will operate and maintain all procured equipment. The GCF project applies these same sustainability measures to all equipment installed and procured with GCF proceeds. As properties of LMS (including the Aviation sector)/LHS, the equipment procured with GCF funds will become part of their observing networks. They will, therefore, be included in the Operations and Maintenance Plan as well as the yearly budget allocations of their respective ministries.

The availability of weather radar and lightning-detection networks techniques for short-term prediction of thunderstorm movement mitigate the impact of weather in disrupting air traffic management and airline operations at airport and airspace. The capacity building that will be provided by the AfDB project will improve NWP and offer great opportunities for enhancing weather services for aviation. It will also improve the capacity of LMS to disseminate in real-time operational aeronautical meteorological data (OPMET), including METeorological Aerodrome Reports (METARs), Terminal Aerodrome Forecasts (TAFs), and Significant Meteorological Information/Airmen's Meteorological Information (SIGMETs/AIRMETs). The AfDB will also support the implementation of the QMS requirement for RIA. Hence, both the AfDB and GCF projects will build the capacities of the LMS, and LHS in cost-recovery for meteorological services, weather forecasts, warnings, and other information, for the needs of civil aviation. Other areas include: weather forecasts and warnings for marine activities, agriculture and fisheries in the sea area of Liberia; and supply of meteorological information and consultative services for the needs of the Liberia community and in particular for applications to agriculture, conservation, and management of water resources, engineering studies and constructions, tourism and industry, renewable energy sources, environmental studies

Liberia's hydromet institutions have, over the years, executed donor-funded projects and successfully sustaining them upon the elapse of the funding period. Currently, there are several donor-supported projects that are ongoing or under preparation to strengthen the capacities of the meteorological and hydrological services because of decades of low investment in public sector institutions, coupled with fourteen years of civil war. This GCF project will take advantage of synergies with similar projects, including those financed by USAID CRUZ and WMO, to consolidate the implementation of activities and increase sustainability.

Component five will provide political support to allocate necessary resources by the government to sustain project results. Enhancing ownership by local administration will be done through an MoU. The local administration will provide a safe and secure location for the installation of early warning equipment and will be responsible for its maintenance. Resources and training could be provided through Agency for Aerial Navigation Safety in Africa and Madagascar (ASECNA), which has three training schools for its staff and third parties: the African School of Meteorology and Civil Aviation (EAMAC) in Niamey, Niger; the Regional School of Fire Fight (ERSI) in Douala, Cameroon; and the Regional School of Air Navigation and Management (ERNAM) in Dakar, Senegal. Collaboration with ASECNA is also needed to sustain the QMS.

The improved capacity of communities under Component Two to use climate risk information in their planning processes and practical early responses to impending extreme weather events will strengthen the sustainability of the climate knowledge and applications generated.

The project includes a strong focus on community engagement, training, and "Last Mile" communication solutions to elevate understanding of climate risks and achieve sustainable change in behaviour among local communities. Establishment and operationalisation of national and local coordination mechanisms will ensure that all stakeholders know what to do, when, and how. Participation of other partners (e.g., NGOs, private sector, and academic institutions) will further promote the long-term sustainability of results. Due to the huge awareness created by this project on the importance of climate and weather information services in planning and development, the project will pave the way for greater involvement of the private sector in the delivery of climate information products and services, risk transfer schemes and risk reduction.

Beyond the project's life, LMS, LHS, NDMA and LNRCS will continue to provide impact-based forecasts and warnings nationwide. At the local level, LMS, LHS, NDMA, LNRCS, IFRC and their co-responsible parties will continue to assist in other urban areas surrounding the project sites and corresponding counties to develop downscaled risk matrices with impact and response tables in a participatory manner. The fact that the agencies will be responsible for covering their respective operating and maintenance costs guarantees the long-term sustainability of the project's investments beyond its completion.

C.6. Financial management/procurement (max. 300 words)

Project's financial management, including financial accounting standards, disbursement, and procurement arrangements (details in Annex 8 for procurement). AE's role to ensure that its fiduciary standards (based on its accreditation type) are adhered to at all times. Methodology and frequency of the periodic financial reviews, reporting of the project expenditures, including the audit

requirements and the frequency of the audit to ensure that funds are used for the intended purposes and project complies with the covenants if any.

The GoL, GCF, AfDB, and EPA rules and procedures will guide the financial management and procurement of the proposed project. The Public Financial Management Law, Public Procurement and Concession Law, GCF no-objection procedure, and the Accredited Entity's financial rules will be applied. The project will be audited, keeping with the aforementioned financial standards and requirements. The national executing entity (EPA) is required to implement the project in compliance with the above rules.

Section 42 of the EPA ACT provides guidelines on accounts, audits, and annual reporting. The ACT compels the Agency to proper books of accounts and records in respect of income and expenditure, assets and liabilities and all affairs of the Agency. It also mandates the Auditor General or a qualified auditor appointed by the Auditor-General to audit the annual accounts of the Agency. The Auditor-General shall, within two months after receipt of the Accounts and Annual Report, submit an opinion on them to the Council, and all records of the accounts, audits and annual reports under this section shall be available to the public upon request to the Agency. Both the Government of Liberia and the Accredited Entity will enshrine these provisions in the project document that will be duly signed. The Project Steering Committee will oversee the utilisation of funds with clear MOUs between the EPA as EE and the implementing partners.

The funding requested for this SAP proposal is non-reimbursable proceeds. The GCF will transfer through the Trustee approved proceeds to AfDB after the FAA effectiveness, and all conditions met for disbursement. AfDB will create a special account for GCF proceeds to undertake funded activity as approved by the GCF Board. AfDB will sign the grant agreement with the Ministry of Finance and Development Planning (MFDP) on behalf of the government of Liberia. The MFDP and the EPA will open a Special account for the management of the project's administrative expenses for small purchases such as office suppliers, payment for project staff, and expenses for supervision, monitoring, and reporting. There will be a minimum of three signatories for checks and withdrawals for small administrative expenses.

AfDB has several guidelines that ensure that the project implementation process adheres to its fiduciary standards. There is a PAR for the project, which should outline all the necessary steps taken by the Bank. In the 'General Conditions' applicable to loan and grant agreements, it is required that all projects and sub-project accounts be audited each year (Internal and External) following the relevant generally accepted standards. The Bank's primary monitoring tools, including post-procurement reviews (PPRs) procurement audits (Pas), independent procurement reviews (IPRs) and other miscellaneous reviews, will be part of the project.

Large procurements such as the acquisition of automatic weather stations will be made directly by the AfDB to suppliers and service providers upon submission of relevant completion documents. Procurement will follow AfDB procurement procedures. The procurement of goods and services, including consulting services over the threshold of US\$500,000 is usually carried out through OCB method (procurement arrangement). Thus, the project procurement plan elaborated in Annex 8, should be the guiding documents for the discussion under procurement arrangements. As stipulated in the procurement plan, activities above \$0.42 million will be procured using the international competitive bidding (ICB) method while those below \$0.42 million will be procured using the national competitive bidding (NCB) method. This is to encourage domestic industries and promote knowledge transfer through the project implementation process.

D. LOGIC FRAMEWORK AND MONITORING, REPORTING AND EVALUATION

This section refers to the project/programme's logic framework per the GCF's Performance Measurement Framework under the Results Management Framework to which the project/programme contributes as a whole, including in respect of any co-financing. This is different from the project/programme-level log frame (as there may be other impact measures, for example, that go beyond those defined by the GCF).

A project-level logical framework, with specific indicators, baselines, and targets, means of verification and assumptions should be provided as part of Annex 2.

D.1. Paradigm shift objectives (max.200 words)

<p>Increased climate-resilient sustainable development</p>	<p>Paradigm shift objectives to which the project/programme contributes. This project contributes to climate-resilient development pathways in Liberia through the sustained impact of project interventions. The project has the potential to ensure a 100% reach in national coverage for observational networks, thus indirectly benefiting the entire population of Liberia. There is also a projected mid-term (2030) direct benefit of more than 1,200,000 people, half (600,000) of whom will be farmers, and more than 200 flood-prone communities across the Country. The final term (2040) direct beneficiaries will rise to approximately 2,312,400 million people. The project promotes a demand-based model for climate information services and the use of ICT/mobile platforms to enable public and private sector participation, innovation, and market development. Enhanced information on climate change will facilitate sound and sustainable adaptation strategies.</p>
	<p>Elaborate on the paradigm shift objectives to which the project/programme contributes. The project will bring about transformational changes in the hydromet business that will foster a significant paradigm shift in the funding and provision of meteorological and hydrological services in Liberia and the West African region. The success of this project will be transformative for a data-sparse region like West Africa. The project approach aligns with WMO standards and regulations for providing hydromet products and services. The project will enable the scale-up of the GEF and NVE projects. It will also ensure the production of invaluable CIS that can be integrated to improve outcomes in agriculture and food security, water resources management, energy production, human health and well-being, transportation, and disaster risk management.</p>

D.2. Impacts measured by GCF indicators

Select the appropriate impact on the project/programme. Note that more than one indicator may be selected per expected impact result. Add the results as appropriate.

Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term 2030	Final 2040	
				<p>These timelines were chosen because the project activity implementation is expected to last for five years, that is, at least until the end of 2025. While the monitoring and evaluation will provide insights on the project impact during its implementation period, the impact measured at the end of the fifth year will not truly reflect the full impact of the project due to the delayed time lapse between activity and results. 2030 will be five years after the project completion, equivalent to the project implementation timeline. 2040 will be fifteen years upon the project completion. The impact can be compared with the trend of the historical baseline of the model, which is from 2006 to 2020.</p>		

Fund-level impacts	<p><i>The number of direct and indirect beneficiaries:</i></p> <p><i>Direct: Rural farmers and settlements along the coastline of the country</i></p> <p><i>Indirect: For coastal erosion, the following counties will benefit Maryland, Grand Kru, Sinoe, River Cess, Grand Bassa, Montserrado, Bomi, and Grand Cape Mount. The counties in the north-west such as Lofa, Gbarpolu, Bong, and Numba, will benefit most from drought information</i></p>	<p>Field surveys</p> <p>Annual reports by NDMA, EPA, and annual assessment reports published by other partners (e.g., UNDP, USAID)</p> <p>Calculation of the percentage reduction in annual monetary loss from climate hazards</p> <p>NDMA reports</p>	0	<p>Direct beneficiaries: At least 20% of the total population (approximately 6,020,000 people in 2030) = 1,200,000</p> <p>Direct beneficiaries by gender: Females = 500,000 Males =700,000</p> <p>Indirect beneficiaries: 100% of the total population, which will be approximately 6,020,000 people by 2040</p> <p>Indirect beneficiaries by gender: Females = 3,000,000 Males =3,020,000</p>	<p>Direct beneficiaries: At least 30% of the total population (approximately 7,708,000 people in 2040) = 2,312,400</p> <p>Direct beneficiaries by gender: Females = 1,100,000 Males =1,212,400</p> <p>Indirect beneficiaries: 70% of the total population, which will be approximately 5,395,600 people by 2040</p> <p>Indirect beneficiaries by gender: Females = 2,679,500 Males =2,716,100</p>	The project implementation is executed as planned.
A1.0 Increased resilience and enhanced livelihoods of the most vulnerable people, communities, and regions	A1.1 Change in expected losses of lives and economic assets (US\$) due to the impact of extreme climate-related disasters in the geographic area of the GCF intervention	Calculation of the percentage reduction in annual monetary loss from climate hazards Public data related to lives loss due to natural disaster in the project area	There will be a continuous increment in the economic losses attributable to climate hazards	At least a 25% reduction in the annual monetary losses through climate hazards 2030	At least a 75% reduction in the annual monetary losses through climate hazards 2040	There will be climate hazards across all or many counties across the country Climate services is mainstreamed in national planning and DRR strategy
A2.0 Increased resilience of health and well-being, and food	A2.2 Number of food-secure households (in areas/periods at risk	Field Surveys Agriculture production output data	100% of food-secure household	70% of food-secured households are at risk	50% of food secure household are at risk	Climate services is mainstreamed in national planning and

and water security	of climate change impacts)		s are at risk			farmer's decision-making
A3.0 Increased resilience of infrastructure and the built environment to climate change threats	A3.1 Number and value of physical assets made more resilient to climate variability and change, considering human benefits (reported where applicable)	EPA Assessment Report	Baseline assessment of climate hazards impact to be undertaken during year 1	At least 30% improvement in the resilience of infrastructure and built environment to climate treats	At least 70% improvement in the resilience of infrastructure and built environment to climate treats	Timely and sufficient mobilization of resources to enhance the resilience of infrastructure and built environment to climate-related treats
A4.0 Improved resilience of ecosystems and ecosystem services	A4.1 Coverage/scale of ecosystems protected and strengthened in response to climate variability and change	EPA Assessment Report	Baseline assessment of climate hazards impact to be undertaken during year 1	35% of coastal and marine ecosystems are protected from climate variability and change	35% of coastal and marine ecosystems are protected from climate variability and change	Climate services is mainstreamed in national climate change strategy and actions

D.3. Outcomes measured by GCF indicators

Expected Outcomes	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term 2022	Final 2025	
				These dates were chosen because of the outcomes related to the outputs which are measured by the physical changes in infrastructure, equipment, personnel, and knowledge levels during the project implementation.		
A5.0 Strengthened institutional and regulatory systems for climate responsive planning and development	A5.1: Institutional and regulatory systems that improve incentives for climate resilience and their effective coordination	Survey/Audit of regulatory systems	Very weak institutional coordination of climate-related activities	2	4	Favorable legislation that support increased incentives for climate resilience and effective implementation
A6.0 Increased generation and use of climate information in decision making	A6.1: Use of climate information products/services in decision-making in climate-sensitive sectors	Climate information and socioeconomic baseline surveys	3	At least 10 institutions (e.g. Agriculture, health, Disaster risk reduction, water resources, transportation, energy)	More than 15 institutions (e.g. Agriculture, health, Disaster risk reduction, water resources, transport	Willingness of institutions to mainstream climate services for decision-making in climate-sensitive sectors

					tation, energy)	
A7.0 Strengthened adaptive capacity and reduced exposure to climate risks	A7.1: Use by vulnerable households, communities, businesses and public-sector services of Fund supported tools, instruments, strategies and activities to respond to climate change and variability	Survey, IPR	0	At least 1,200,000 beneficiaries (50% will be females)	At least 2,312,400 beneficiaries (50% will be females)	At least the adaptive capacity of 30% of Liberian population would have been strengthened in the mid-term and close to 70% at the long-term, if funds are available
A8.0 Strengthened awareness of climate threats and risk reduction processes	A8.1: Number of males and females made aware of climate threats and related appropriate responses	Socio-economic baseline survey, M&E report, and Annual performance report	575,000 men and women	Disaggregated beneficiaries include 500,000 Females and 700,000 Males	Disaggregated beneficiaries include 1,100,000 Females and 1,212,400 Males	Beneficiaries are willing to assimilate climate information related to treats and risk in their routine decision-making

D.4. Arrangements for Monitoring, Reporting, and Evaluation (max. 300 words)

Project specific institutional setting and implementation arrangements for monitoring, reporting, and evaluation. Description of how the independent interim/mid-term and final evaluations will be organised during the implementation period.

A MEL plan will be developed to serve as the blueprint for implementing and managing the MEL System. The document presents the methodology and tools to collect and report data on each of the results indicators included in the RMF and the roles and responsibilities of the actors involved in implementing and managing the plan. Annexed to the plan will be the RIRS, providing a precise definition for each results indicator and specifying the unit of measurement, the data collection and management methodology, the potential data limitations and mitigation measures, and the reporting schedule. A baseline analysis will be undertaken during the first year of implementation to collect missing baseline data for the indicators. An in-depth gender analysis will also be undertaken to collect the required data to support a gender-sensitive approach to implementation. Moreover, to ensure continuous quality of data, a DQA will be conducted on a bi-yearly basis. Quality procedures will also be put in place to ensure that data standards are respected during the entire life of the project.

A results indicator tracking matrix will be developed as performance assessment tools progress achieved for each indicator. Another important tool for tracking progress is the MEL software, which will be important for the collection, analysis, and management of data. The software will also provide a decision support platform, work program and budget tracking tools and collaborative work environments.

Given the limited staff of the LMS and LHS, the additional support staff will be recruited as needed to collect data on indicators. This includes field agents responsible for collecting data related to the effectiveness of warning dissemination and communication and enhancing preparedness.

The project will benefit from ongoing desk supervision by the AfDB task manager. Also, two supervision missions will be undertaken each year. An IPR detailing progress, implementation challenges and way forward will be prepared after each supervision. The task managers will closely follow-up on the implementation of the recommendations of the mission. The Project will also undergo an Annual Performance Review (APR), as stipulated in the Accredited Master Agreement (AMA) between the AfDB and GCF.

A mid-term review will be undertaken during the third year of the project. An MTR report with findings and recommendations will be produced and processed by the AfDB, following the mission. Here again, the task manager will closely follow-up with the recommendations. In accordance with the Fund's Management and Accountability

Framework (MAF), an independent consultant will be recruited to undertake a mid-term evaluation of the project's activities.

Once the project reaches a disbursement level of 85%, a project completion mission will be conducted. The mission will provide an opportunity to take stock of the project achievements against the RMF. It will also help draw lessons on what worked and what did not during project implementation. The effectiveness and efficiency of the projects and sustainability of project results are assessed during the mission. The PCR is then used to inform the design of future projects and to improve the implementation of ongoing operations. An independent evaluation of the project will also be undertaken at completion, in accordance with the MAF.

The project will conform to donor reporting requirements. It will prepare APR, IPR, MTR, PCR as well as other periodic reports such as quarterly technical and financial reports on time.

Efforts will be made to ensure that the capacity in M&E of implementation actors is built. From project start-up, he/she will aid. Specialised training will be offered when needed. Support from the AfDB and the GCF M&E teams may be solicited in this area.

An impact evaluation of the project will be undertaken. The project will be recommended to the LORTA Program for support to undertake a regular assessment on the effectiveness of implementation, the likelihood of achieving results and the causal change that may be attributed to the GCF investment. Funding has been included in the budget to ensure that an impact evaluation of the project occurs even if the project is not selected for the LORTA program.

E. EXPECTED PERFORMANCE AGAINST INVESTMENT CRITERIA

E.1. Impact potential (max. 300 words)

E.1.1. Expected tons of carbon dioxide equivalent (t CO ₂ eq) to be reduced or avoided (Mitigation and cross-cutting)	Annual	Click here to enter text.tCO ₂ eq
	Lifetime	Click here to enter text.tCO ₂ eq
E.1.2. Expected total number of direct and indirect beneficiaries, disaggregated by gender (Adaptation and Cross-cutting)	Direct	2,312,400 (Consisting of 1,100,000 females and 1,212,400 males respectively by 2040).
	Indirect	5,395,600 (Consisting of 2,679,500 females and 2,716,100 males)
	<i>*For both, Specify the % of females against the total number. 49.03%</i>	
E.1.3. Percentage of beneficiaries relative to the total population	Direct	30% (Consisting of 14.27% females and 15.73% males)
	Indirect	70% (Consisting of 34.76% females and 35.24% males)

The total population of Liberia in the modelled calculation is projected to reach 7,708,000 people in 2040. Using the current gender dynamic trends, the gender composition of this population will be 3,880,000 (50.34%) males and 3,828,000 (49.66%) females by 2040. The projected number of people who will be directly impacted by climate hazards under the 75% loss increase using only the 2006 fractional GDP loss as a proxy for the cost of climate hazards is estimated at 177,289, equivalent to 2.3% of the total population. The total direct impact by 2040 all factors considered, is estimated at approximately (30% of the total population) 2,312,400 people, constituting 1,100,000 females and 1,212,400 males. The actual indirect impact then becomes 7,708,000 – 2,312,400 = 5,395,600, equivalent to 70% of the population.

E.1.4. *Potential of the project to contribute to the achievement of the Fund's objectives and result areas. The impact for adaptation.*

The project will support adaptation to climate change in Liberia (i) directly through improved severe weather and flood forecasting and climate services for approximately 2,312,400 people consisting of 47.4% women and (ii) indirectly through enhanced service delivery of LMS and LHS to approximately 5,395,600 people 49.7% of whom are women, largely depend on weather and climate-sensitive sectors. The potential gains of the project include (i) reduction in the adverse impacts of climate-related hazards on lives and livelihoods; (ii) improved use of the best available climate

science and data to provide evidence-based climate action; (iii) leveraging and enhancing the sustainability of existing investments in the meteorological and hydrological sector including those of the recently completed GEF project; (iv) Coordinated hydromet activities to provide fit-for-purpose products and services to end-users and customers through the most effective communication medium.

Consequently, the intervention will help put in place preparatory measures and disaster management plans to reduce sickness and mortality associated with frequent climate risks in the country. According to the World Health Organization (WHO) studies, the estimated disability-adjusted life year (DALYs) of Liberia, reflecting years of life lost (YLL) of 2,044,200 and years lost due to disability (YLD) 469,600 of for the and 2016 is 2,513,800. Using Gross National income of \$3.25 billion as the measure of units of wealth for 2016, the US\$/DALY saved for the country for all diseases could be \$1,292,863.39. Although data on DALY for specific diseases associated with climate-related disasters are not available, this could provide a surrogate estimate. This intervention will contribute to the GCF objective of reducing vulnerabilities of populations to climate risks and cost savings from the reduction of climate-change-related disease burden.

Agriculture is one of the sectors most exposed to climate hazards in Liberia. In 2018, the WFP developed a 5-year (2019-2023) country strategic plan for Liberia³⁷, with a keen focus on promoting food security. Given that the majority of Liberians depend on agriculture for their livelihoods, the IFRC in collaboration with the LNRCS and NDMA will be an important partner in designing robust FbF mechanisms to initiate early climate action.

E.2. Paradigm shift potential (max. 300 words)

Describe the degree to which the proposed activity can catalyze impact beyond a one-off project or programme Investment.

Liberia lacks critical climate data for an in-depth climate impact analysis. One fundamental benefit of this project will be the provision of fundamental resources to collect data about climate change, and factoring that into the national decision-making process to derive economic, social, and environmental benefits. The Liberia Climate Impact Assessment Model (LICIAM), a system dynamics-based simulation model which was developed to assess the climate impact in Liberia highlights some potential co-benefits that can be accrued as a result of subverted climate cost (see details of the model in Annex 13). The provision of infrastructure will improve the quality of climate data, strengthen impact-based forecasting, and inform forecast-based financing mechanisms. The estimated economic losses, as well as the social and environmental impact emanating from climate risks and hazards under the baseline scenario, will be more than \$11 million (see annex 13 for a detailed analysis) annually by 2030. This means that, within five years, the climate impact in Liberia will exceed \$50 million. These figures are still an understatement of the actual impact because this assessment is anchored on GDP, which does not present the full picture of climate impact because of the large, unrepresented informal economy in the country.

Both the LMS and LHS play a crucial role in providing weather-, water- and climate-related services for DRR, climate change resilience and sustainable development. They provide direct and visible public service benefits for citizens. The rewards of integrating hydromet services in the decision-making process cannot be overemphasised; still, limited fiscal capacity serves as a huge barrier to transforming the hydromet sector. Both meteorological and hydrological services suffer from a limited budget, degraded infrastructure, security issues, poor staff retention, and weak professional staff and institutional capacity. These underlying weaknesses limit opportunities for significant improvement in the medium term, even with ongoing donor-supported interventions.

This project proposes an innovative policy, management, technology, and finance approach to equip hydromet institutions and enable them to deliver on their mandate purposefully.

On the policy front, there is limited cross-institutional climate information flow, and projects are executed in silos. The project calls for a higher level of cooperation across ministries, and other relevant institutions by establishing the climate information centre—a collaborative space for open communication on hazards and potential disasters. In terms of management, the project defines a clear hierarchy of authority along with an implementation apparatus with accountability mechanisms to ensure continuity and transparency. The acquisition of high-speed internet, automatic weather observation stations, central forecasting office are some of the innovative technological advancements

³⁷ WFP 2018. **Liberia country strategic plan (2019–2023)**. World Food Programme, Via Cesare Giulio Viola, 68/70, 00148 Rome, Italy

proposed by the project to overcome the challenges faced by hydromet institutions for proper service delivery. On financial innovation, the project proposes a business model that will yield revenue through climate information services in the form of the Liberian Climate Change Trust Fund, which will contribute to both sustaining project results and the financial independence of LMS and LHS.

There is limited capacity to forecast the impact of climate hazards and mobilise the required financial resources in response—the project's FBF component will address these limitations. The establishment of the climate-smart information labs, the enhanced environmental lab and established geospatial information lab will be an intermediary between the LMS, LHS, NDMA and the end-users. These systems will contribute to the positive transformation in service delivery required to generate revenue from tailored climate product and services. As part of the FbF interventions, an institutional collaboration will be established with NDMA. This collaboration will help mobilise additional disaster relief funding, attract support from external partners, and ultimately increase the resources available for impact-based early actions.

In light of these innovations, a significant paradigm shift in the funding and provision of hydrometeorological services is expected for Liberia and the West African region. The success of this project will be transformative for a data-sparse region like West Africa, where investments in weather and climate enterprise are extremely low. The project approach conforms to WMO standards and regulations for providing hydromet products and services. The project will enable the scaling up of the GCF and NVE projects and ensure the production of valued services that can be integrated to improve outcomes in agriculture and food security, water resources management, energy production, human health and well-being, transportation and disaster risk management.

Furthermore, the project will integrate and build on the country's Readiness programme and facilitate the seamless implementation of the WMO National Framework for Climate Services (NFCS) by addressing major challenges identified in five (5) thematic areas, namely: hydrology, agricultural meteorology, disaster risk management, weather forecasting, and communication and observation³⁸.

The project will bridge the sustainability gap in hydrological projects through the provision of funds for operations and the procurement and installation of sophisticated automated observing stations to increase the density of the observation network. For agro-meteorology, database and quality management system will be established, and hardware and software provided to aid the collection, processing, analysis, transmission and archiving of agromet data. Training will be provided to the LMS and LHS technical staffs on operating and managing the equipment.

The lack of observation networks in one area negatively impact the quality of the forecast and analysis products globally. The observation networks in many parts of the globe are still not fully automated. Since February, Aircraft observations declined by approximately 80% globally, and close to 90% in the tropics and in the Southern Hemisphere, where already fewer observations are available. The presence of observation networks in Liberia will, therefore, contribute to the overall quality of the global system.

On the ground, surface data has decreased significantly since the beginning of the coronavirus 2019 (COVID-19) crisis, especially over Africa. This is partly due to the reliance on human-crewed observing stations subject to lockdowns. Over the ocean, the impact of the pandemic led to a decline in voluntary ship observations by approximately 80% compared to pre-COVID-19 baseline. COVID-19 crisis, therefore, highlights the importance of GBON and SOFF. The expansion of automation will improve reporting frequency and resilience.

The project will contribute to DRM with timely and relevant climate information dissemination systems for enhanced EWS. For weather forecasting, modern infrastructure will be established— including high-end computing facilities – to provide an enabling environment for numerical weather, climate, and hydrological predictions. The damaged Preparation for the Use of Meteosat in Africa (PUMA) equipment will be rehabilitated, and Automated Weather

³⁸ National Consultation Workshop on National Framework for Climate Services in Liberia (<https://gfcs.wmo.int/sites/default/files/events/National%20Consultation%20Workshop%20on%20the%20National%20Framework%20for%20Climate%20Services%20in%20Liberia/Notes%20for%20the%20Consultative%20MET%20Workshop.pdf>) (Assessed 31 Mar 2020)

Observing System (AWOS), e-infrastructure and a radio detection and ranging (RADAR) system will be installed to enhance forecasting.

Lastly, on communication and observation, the project will enhance the emergency operations centre at the NDMA to obtain information from LMS, LHS and EPA labs, for early disaster response. The observational data will also be processed, interpreted, packaged, and disseminated through other media like websites, mobile text messages, climate, weather, and seasonal forecast bulletin. The project will also provide facilities such as a weather forecast studio that will communicate weather and climate information via website, radio and television for the benefit of the entire population.

E.3. Sustainable development (max. 300 words)

Describe the wider benefits and priorities of the project/programmes in relation to the sustainable development goals and provide an estimation of the impact potential in terms of:

- *Environmental co-benefits*
- *Social co-benefits*
- *Economic co-benefits*
- *Gender-sensitive development impact*

The project will provide a significant environment, social, economic, and gender co-benefits for Liberia

Liberia’s recognition and inclusion of climate issues in its strategic national development agenda align with the SDGs, the Paris Agreement, and the Sendai Framework. The latter recommends multi-hazard early warning systems as a sound DRR investment strategy and promotes its incorporation into development and planning. It seeks to substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments by 2030.

Environmental benefits:

Most natural resources in Liberia are climate-sensitive: plant and animal species are sensitive to weather extremes, and communities are broadly distributed along climatic gradients. Soil resources are less sensitive to climate extremes but develop over time within a climatic regime characterised by mean values. Thus, climate variability and change could potentially affect these resources and the human communities that depend upon them. Climate change impacts on natural forested ecosystems, specially protected areas, are exacerbated by short-term stresses from development activity. Many of these stressors, such as extreme weather, floods, and rising temperature, manifest throughout the country while others, including coastal erosion, are limited to one region. Similarly, certain resource systems are impacted by most stressors but in different ways depending on the resource subsystem, such as agriculture (e.g., smallholder versus commercial operator).

The project will indirectly support the development of a vibrant and sustainable environment by enabling accurate predictions for better flood management and risk-informed planning of agriculture and fisheries, strengthened ecosystem resilience, and improved soil, air, and water quality. For example, farmers and fishers will have access to relevant data that can guide their planning and decisions. Through short- and long-term forecasting, farmers will gain knowledge and adapt their practices to be more effective, economical, and precise. This project will enhance adaptability for climate-sensitive zones and sectors.

Social benefits:

A social vulnerability assessment of Liberia showed 12 indicators that affect the social status of citizens in relation to their health and economic well-being at the district level: Displaced Population, Distance to Improved Drinking Water, Distance to Medical Facility, Illiterate Population, Households not involved in Fishing, Households Lacking Furniture, Households with no Livestock, Households Lacking a Mattress, Households with no Poultry, Substandard Housing,

Unimproved Drinking Water Source, and Unimproved Sanitation³⁹. Life expectancy in Liberia has increased substantially since the mid-1990s. It doubled from 28 to 56 years between 1995 to 2008 and is projected to reach 62 years by 2025. Infant and childhood mortality has declined from 230 to 80 per thousand births between 1995 and 2008. However, there is a high social dependency in the country. The age structure also revealed that over 40% of the population is “dependent,” defined as under five and over 65 years old.

The project will provide early warnings and climate information to improve the health, safety, comfort, and security of the most vulnerable people and communities living along the vast erosion-prone coastline. This, in turn, will positively affect people’s health and well-being by reducing the number of households impacted by hydromet-related disaster events. The outcome of this project will also facilitate resilience through enhanced climate risk awareness and response.

Economic benefits:

The majority of Liberians, especially women, depend on agriculture-related activities for their livelihoods. However, most rural households are food insecure. Nationally, 80% of the rural population was either moderately vulnerable (41%) or highly vulnerable (40%) to food insecurity. The most food insecure groups are those involved in palm oil production and selling, followed by hunters and contract labourers.

Unemployment remains a major issue in Liberia ranging 80 and 85 percent of the working population (males: 77 percent; females: 94.1 percent)⁴⁰. Sixty-eight percent of employed Liberians work in the informal sector, without regular wages or benefits and with significant gender disparities of 69 percent males and 90.9 percent females. Youth employment is also very low.

Approximately US\$6.17 million losses are recorded in Liberia as a result of climate hazards. This figure is expected to almost double in the next decade, and triple by 2040 under the baseline scenario. The project will strengthen the LMS and LHS capacity to produce tailored, sector-specific information climate information services for the benefit of the most vulnerable. This will significantly contribute to reducing the loss in GDP.

Gender benefits:

Liberia requires proactive measures to support women’s contribution to the country’s development. According to the 2017 Gender Inequality Index (GII), Liberia ranks 154 out of 160 countries. Approximately 40% of the female workforce is engaged in the agricultural sector, accounting for 80 percent of the agricultural labour force. Providing climate information services that contribute to increasing productivity in agriculture and other sectors will significantly contribute to closing the gender gap. Out of the 2.3 million direct and 5.4 million indirect beneficiaries estimated, the project seeks to positively impact more than 50% of women in Liberia. This will be achieved through a gender-differentiated vulnerability analysis, focused capacity building participatory design of products.

Provide a summary of the gender assessment and project/programme-level gender action plan that is aligned with the objectives of GCF’s Policy. Please provide the full gender assessment and project-level gender action plan as an annex to the funding proposal.

The gender assessment of this project is guided by the GCF and Government of Liberia gender policies. Both men and women have crucial roles in responding effectively to climate risks, which play an important role in building resilience and sustaining livelihoods. The GCF Gender Policy highlights three main focus areas:

- a) Gender equality is fundamental in combating climate change. There is a need for a paradigm shift towards the development of low-emission and climate-resilient pathways, based on the GCF mandate, to ensure a greater impact on participants (both men and women) and a collective decision-making process.

³⁹ Stanturf, J.A., Goodrick, S., Warren, M., Stegall, C. and Williams, M., 2013. Liberia climate change assessment. *USAID/US For. Serv. Int. Prog.*, pp.1-136.

⁴⁰ According to the World Bank Liberia Household Income and Expenditure Survey for 2016, the difference between men and women is 24.1 percentage points (69 percent versus 90.9 percent). See <http://microdata.worldbank.org/index.php/catalog/2986>.

- b) Climate-change impacts are not gender-neutral as women and men are affected differently, and this policy embraces gender-responsive approaches to addressing the existing gender inequalities that are likely to be exacerbated by climate change; and
- c) The gender inequality, vulnerability, and risks should not be addressed in isolation. Therefore, the EIF Gender policy pronounces the need for equal benefits for men and women during any GCF interventions and financing.

The project will focus on gender-sensitive planning and implementation to ensure the highest gains in the fight for gender equality and equity. Upon commencement of the project, an in-depth gender analysis will be undertaken to collect the required data to support a gender-sensitive approach to implementation. The gender analysis will cover (i) gender disparities relevant to the implementation of the programme; (ii) systemic barriers to gender equality in the agriculture sector and opportunities to address them within the capacity of the programme; (iii) the current level of knowledge about Climate-Smart Agriculture practices and knowledge gaps to be addressed through capacity building and awareness-raising activities; and (vi) specific components or other mechanisms to ensure that both women and men participate in and benefit from the programme.

There are also health and general co-benefits that will emerge from the project. The project will equip Liberia to preempt the dire consequences of pandemics such as COVID-19, through Forecast-based Financing. When Forecast-based Financing is combined with the early response to a climate shock and resilience/disaster risk reduction activities, the co-benefits are maximised. Empirical evidence from a study in Nepal in 2018 indicated that the implementation of a forecast-based financing approach would save US\$22 million when responding to an emergency of average size (175,000 affected people). The study also revealed that up to US\$34 and 42kg of CO₂ emissions could be saved per dollar invested within twenty years, after deducting the investment cost (Forecast-based Financing in Nepal: A Return on Investment Study, WFP, 2019).

In Ethiopia, Kenya and Somalia, USAID found that an early response to drought, combined with safety net transfers and resilience-building activities, could over 15 years save US\$4.3 billion, or an average of US\$287 million per year (Forecast-Based Financing: Moving from crisis response to risk management, WFP⁴¹). A Cost-Benefit Analysis carried out in Sudan and Nigeria in 2015 indicated that using a forecast-based system would lower the cost of emergency response by 50 percent and that the net cost of late humanitarian response is four to seven times higher than multi-year resilience-building. The potential co-benefits for Liberia through the implementation of this project, are enormous.

E.4. Needs of the recipient (max. 300 words)

Describe the scale and intensity of vulnerability of the country and beneficiary groups and elaborate on how the project/programme addresses the issue (e.g., the level of exposure to climate risks for beneficiary country and groups, overall income level, etc.).

Climate change continues to be one of the major threats to development in Liberia. As aforementioned, the country is extremely vulnerable to climate risks and climate-related hazards because of its low level of adaptive capacity, a result of its weak human, institutional, technological, financial, infrastructure and other capacities. The impact of climate change on priority sectors—agriculture and food security, health, energy, water resources, forestry and wildlife, coastal area, fishery, mining, industry, transport, and tourism—has increased over time⁴². Climate model project up to 2.6 °C increase in surface temperature by 2060, 0.13-0.56 m increase in sea levels by 2100, and an increase in the frequency and intensity of extreme weather events⁴³. The associated impacts include increased crop loss due to extreme weather events and more pests, weeds, and pathogens attacks, which will negatively reduce agricultural production and pose a risk to food security. It includes a reduction in water quality and water levels for basic sanitation infrastructure. It includes damages to houses and infrastructure as a result of coastal flooding and erosion. It also includes loss of livelihood as a result of biodiversity reduction and shifts in the distribution of species. Lastly, it includes an increased risk of vector-, air- and waterborne diseases.

⁴¹ <https://reliefweb.int/sites/reliefweb.int/files/resources/WFP-0000069094.pdf>

⁴² National Policy and Response Strategy on Climate Change (2018)

⁴³ USAID (2017) Climate Risk Profile in Liberia. The Climate Change Adaptation, Thought Leadership and Assessments (ATLAS).

The impacts of climate change are expected to be significantly felt by women because they are the dominant users of natural resources (land and water) at the household level in Liberia⁴⁴. Women, children, and youth are described as the most vulnerable groups to the effects of climate change, and gender has a critical role to play in the proposed Pro-Poor Agenda for Prosperity and Development of the Government of Liberia⁴⁵. There is a critical challenge of livelihood vulnerability to climate change across Liberia due to its dependence on climate-sensitive sectors such as agriculture and forestry and artisanal fishing. These sectors are where most females in the country earn a living, either through formal or self-employment. In providing climate information services to ensure the sustainable development of these climate-sensitive sectors, the project will significantly contribute to reducing this GDP gap.

Describe how the project/programme addresses the following needs:

- *The economic and social development level of the country and the affected population*
- *Absence of alternative sources of financing (e.g., fiscal or balance of payment gap that prevents from addressing the needs of the country; and lack of depth and history in the local capital market)*
- *Need for strengthening institutions and implementation capacity.*

Liberia is among the Heavily Indebted Poor Countries (HIPC) as of March 2019⁴⁶. The national poverty line of the country is 54.1% for the period 2016 – 2017; 20.4% of her population is subjected to multidimensional poverty⁴⁷, and Liberia is ranked 176 with a low human development index⁴⁸.

In 2018 Liberia's public debt increased from 1,115 million recorded in 2017 to 1,296 million⁴⁹, an increment of US\$181 million. This amount led to a rise in the national debt from 33.96% of GDP in 2017 to 39.91% of GDP in 2018, a 5.95 percentage point rise. The country's indebtedness, in addition to the dwindling government's budgetary allocation for hydrological and meteorological services, poses a great challenge for innovations and transformation in the sector and prevents hydromet services from achieving their mandates. In the absence of this project, the growth and development of the LMS and LHS are uncertain; more so, ongoing donor interventions are unlikely to be sustainable.

It is important to develop and strengthen the institutional capacities in the country to implement the proposed project successfully. The process proposed adopts a lateral and decentralised communication and information flow system.

E.5. Country ownership (max. 500 words)

Please describe how the project/programme contributes to the country's (or countries') identified national priorities (e.g., country's NDC, national climate strategies, relevant sectoral policies, or other plans such as Nationally Appropriate Mitigation Actions (NAMAs), NAPs, NAPAs, Technology Needs Assessments (TNAs), National Communications to the United Nations Framework Convention on Climate Change (UNFCCC) or equivalent. Please describe which priorities identified in these documents the proposed project is aiming to address and/or improve.

The information in Table E.5.1 depicts climate risk hazards, the vulnerable sectors, as well as the priority sectors of Liberia, as identified in its NDC and NAP.

⁴⁴ <https://reliefweb.int/report/liberia/integrating-gender-mitigation-climate-change> (Accessed 13 Jan 2020)

⁴⁵ Pro-Poor Agenda for Prosperity and Development (PAPD), MFDP, Monrovia, Liberia (2018)

⁴⁶ <https://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/16/11/Debt-Relief-Under-the-Heavily-Indebted-Poor-Countries-Initiative> (Accessed on 13 Jan 2020)

⁴⁷ <http://hdr.undp.org/en/composite/MPI> (Assessed 22 Mar 2020)

⁴⁸ <http://hdr.undp.org/en/countries/profiles/LBR> (Assessed 22 Mar 2020)

⁴⁹ <https://countryeconomy.com/national-debt/liberia> (Accessed 13 Jan 2020)

Country	Climate Risks					Total	Vulnerability					Total	Priority sectors					Total
	Extreme weather	Floods	Droughts	Temperature increase	Sea level rise		Agriculture	Water	Health	Ecosystems	Coastal zones		Agriculture	Water	Health	Biodiversity/ecosystems	Forestry	
1 = mentioned in NDC; 0 = not mentioned in NDC																		
Liberia	1	1	0	1	0	3	1	0	1	0	1	3	1	1	1	0	1	4

Table E.5.1: Key climate risks and identified sectors in Liberia's NDCs

The top five climate risks in the NDCs submitted globally include extreme weather, floods, droughts, temperature increase, and sea-level rise. Liberia mentioned three of these in its NDCs. The top-five climate vulnerability sectors that most countries identified in their NDCs are agriculture, water, health, ecosystems, and coastal zones. In contrast, the priority sectors include agriculture, water, health, biodiversity/ecosystems, and forestry. Liberia mentioned three and four of the top-five global vulnerability and priority sectors, respectively, in its NDCs. This suggests that climate risks are of major concern in the country, and key economic sectors are exposed to these risks and are most vulnerable to climate hazards.

Liberia ratified the Paris Agreement, thereby registering its commitment to the adoption and implementation of policies and measures to adapt to climate change and to manage increasing climate risks, including enhancing preparedness and response capability. The establishment of a climate change governance structure and national policy solidifies that commitment, as does the NDC and NCCPRS emphasise which set clear targets and interventions toward reducing greenhouse gas emissions and increasing resilience.

The various components of the project align with the Government's PAPD. In Section 5.2.1.5 of the PAPD, the Government commits to mainstreaming environmental issues through awareness of the impact of climate change. Additionally, the aspiration expressed in the NCCPRS of "a climate-resilient low carbon nation that responds to climate change while equally sustainably addressing its national development priorities" sets the tone for defining national and local actions and interventions.

Please provide a full description of the steps taken to ensure country ownership, including engagement with relevant NDAs on the funding proposal design and applicable no-objection letter(s), and how the country ownership is embedded in scope and concept of the project/programme.

The proposed components of the project have been co-designed with extensive consultations and involvement of key actors. The National Climate Change Secretariat and Environmental Protection Agency played an active role in leading stakeholder engagements and building consensus.

The project is aligned with the priorities of Liberia Country Strategic Plan (2019-2023), which seek to integrate green growth, environmental resilience, and adaptation into national development planning through effective climate information systems. The project is consistent with the goals of Liberia's National Vision 2030, which aim to reduce poverty, promote social-economic development, and reduce the impact of weather and climate-related disasters in the country. The project will contribute to the efforts of the Government of Liberia to both reduce the vulnerability of its population to weather and climate risk and to ensure the sustainable development of the country. It will also strengthen the hydro-meteorological sector's ability to contribute to the objectives of Liberia's National Development Plan.

Please describe experience and track record of the AE and EE(s) with respect to the activities that they are expected to undertake in the proposed project/programme. Please mention the AE's and EE's experience in the country/region, the sector, and experience of handling projects of similar funding cost. Describe in what way the AE is well placed to undertake the planned activities and what will be the implementation arrangements with the EE(s) and implementing partners.

AfDB, acting as the GCF-AE, will oversee appropriate implementation of the project in line with AfDB procedures and standards, and specific requirements in the AMA agreed with the GCF. AfDB has successfully handled several ongoing and pipeline projects in Liberia (Table 4). Presently, **the AfDB has 16 on-going and recently approved operations in Liberia with a total commitment of UA 281.54 million, an equivalent of US\$ 390 million.** This includes 15 sovereign operations, which account for over 95% of total commitment, and one non-sovereign operation, which is still being negotiated with the beneficiary institution. The active portfolio spreads over six sectors and is heavily invested in infrastructure, predominantly, roads and energy, amounting to a total of UA 221.16 million (US\$309.62 million) or 77% of the total commitments. The transport sector accounts for the largest share of the portfolio (57%), followed by energy (19.75%), agriculture and rural development (13.30%), and multi-sector (3%). The average project size in Liberia is UA 16.90 million (US\$23.67 million), as shown in Table E.5.2.

The AfDB has experience in implementing climate resilience and adaptation-related efforts that offer synergies around climate information, early warning systems, climate disaster planning, financing, and management. Over the last three years AE has implemented hydromet and climate risks interventions worth over US\$ 100 million (including the Cyclone Idai Emergency Recovery and Resilience Project (IERRP) and about US\$ 3 million hydromet initiative in Liberia. The Climate for Development in Africa (ClimDev-Africa) is a joint initiative of the AfDB, the Commission of the African Union (AUC) and the United Nations Economic Commission for Africa (UNECA) to develop and promote climate information for sustainable development in Africa. The ClimDev-Africa Special Fund (CDSF) managed by the AfDB primarily focuses on strengthening the generation, dissemination and use of climate data and information. Over the years, the AfDB has developed different funding modalities and tools, which have guided climate-related disaster risk management/reduction activities.

The Environmental Protection Agency (EPA) is the Executing Entity (EE) for the project. The EPA is a regulatory institution of the Government of Liberia for the sustainable management of the environment and its natural resources. The Agency was established by an act of the Legislature November 26, 2002 and published into hand bill on April 30, 2003. The EPA operates on three basic legal Instruments: The National Environmental Policy (NEP), The Environmental Management and Protection Law of Liberia and the Act Creating the Environmental Protection Agency. Of these three instruments, the National Environmental Policy ordered the creation of the Environmental Protection Agency to ensure sound environmental management and put in place measure to avoid irreparable damage to the country's natural resources. The Act creating the EPA provides the legal mandates and authority to manage coordinate, monitor and supervise in consultation with relevant line Ministries, Agencies and organization, and other relevant stakeholders for the protection of the environment and sustainable use of natural resources. The act details the functions of the EPA from the Policy Council to environmental inspectors. The Act also clearly explain the entire environmental impact assessment (EIA) process in its totality. Among the mission of the EPA are i) Working with partners to create effective environmental communication, education and public awareness; ii) Developing laws, regulations, policies and standards; iii) Effectively monitoring compliance to environmental laws and policies; iv) Providing high quality information and advising on the state of the environment and related matters; v) Ensuring effective environmental planning and reporting.

EPA has track record in implementing projects in Liberia. This includes the GEF US\$3.0 Million funding under GEF 6 Replenishment Period for climate change activities within the Energy Access Project through the AfDB and The European Union EUR 6,000,000.00 grant to address climate change in Liberia under the auspices of the European Union Global Climate Change Alliance (GCCA+). The EPA is the national designated authority (NDA) for the GCF. Under the GCF Readiness Support Programme, the EPA through UNDP is a beneficiary of the Programme in the amount of US\$3,000,000.00 for the preparation of Liberia's National Adaptation Plan (NAP).

The partnering agencies IFRC, LNRCS and the Red Cross Red Crescent Climate Centre are currently committed to implement specific project activities. The AE and EE are also exploring engagements with other potential Implementing Partners such as ICTP, WFP and the UNDP to help improve the synergy between related activities by these institutions and to mutually reinforce the outcomes from related activities.

The IFRC represents a Red Cross or Red Crescent Society in each of the 49 countries in sub-Saharan Africa through network of over 12,000 local branches at the heart of a community, run by over 1.4 million volunteers. Each National Society was created by an act of parliament, which passed a law recognizing the Society as both independent and an auxiliary to government for the purpose of meeting humanitarian and development needs. National Societies, and their local branches, represent a unique and essential component of civil society and local action groups that can enhance cooperation between communities and the government to prepare for and respond to the humanitarian needs and emergencies. IFRC has the capacity to implement this project based on its experience supporting the 49 National Societies in Africa to implement Disaster Risk Reduction and Resilience project. For example, IFRC has supported the implementation of the Global Framework for Climate Services (GFCS) in Malawi and Tanzania. The project supports communities to access climate information services for community based planning and decision making. The project currently in its second phase started in 2016. LNRCS has been for along time supporting with Climate Information and Early Warning Systems (CIEWS) project in communities in Liberia among other epidemic preparedness and response, Water Sanitation and Hygiene (WASH), Health, Community engagement and accountability, protection and gender integration and DRR & resilience projects. The IFRC Cluster Office for the West Coast, in Abuja and the Regional Office in Nairobi will provide technical support to LNRCS in the implementation of the project.



The ICTP is being engaged to implement the IoT for establishing reliable observing and monitoring information networks and setting up e-infrastructure for establishing high-end computing resources for operational and research. The Centre is well known for its vast expertise in providing reliable and sustainable wireless solutions to help foster science and research in developing countries. It will support the organisation of training activities on state-of-the-art wireless technologies as well as active collaborations with academic partners and international organisations⁵⁰. Engagement with WFP is focusing on implementation of the proposed FBF mechanism since they invented the mechanism⁵¹. The FBF is an innovative approach that enables anticipatory actions for disaster mitigation at the community and national levels using credible seasonal and weather forecasts. The WFP has successfully demonstrated the value of FBF in over 13 countries hit by different categories of natural disasters, including Haiti, Niger, Sudan, Nepal, Philippines, Mozambique, and Ethiopia, among others.

⁵⁰ <http://wireless.ictp.it/training.html> (Assessed 20 Mar 2020)

⁵¹ <https://www.wfp.org/publications/forecast-based-financing-fbf-anticipatory-actions-food-security-2019> (Assessed 20 Mar 2020)

The UNDP is a worldwide development partner with track records in over 170 countries and territories⁵². UNDP is directing resources to strengthen new frameworks for development, disaster risk reduction, and climate change. The organisation supports countries to achieve the SDGs. UNDP currently has a budget of over US\$5 billion and over 4,000 projects, including climate-related projects, in 150 countries with a large pool of 753 donors⁵³. The experience and expertise of UNDP in intersecting national activities in Liberia would be a huge advantage to this project.

Liberia: Approved & ongoing Portfolio as at July 25, 2019						
	Project Name	Date Approved	Closing Date	Amount Approved (M UA)	Amount Disbursed (M UA)	Status
Agriculture and Rural Development				38.24		
1	Smallholder Agriculture Productivity Enhancement and Commercialization Project (SAPEC)	02.05.2012	29.06.2020	37.33	24.70	ONGO/PPP
2	Scaling up the Participation of SMEs in the Secondary Wood Processing Industry	14.09.2018	30.06.2021	0.72	0.10	ONGO
3	Development of Agricultural Value Chains in Liberia	13.04.2019	30.03.2021	0.199	0	ONGO
Power/Energy				56.78		
4	CLSG-Rural Electrification -Liberia	06.11.2013	31.10.2020	17.96	0.38	ONGO
5	CLSG Electricity Interconnection Project	06.11.2013	31.10.2020	8.10	2.5	ONGO
6	Liberia Energy Efficiency and Access Project	13.12.2016	31.12.2020	30.72	2.70	ONGO
Social				0.155		
7	Technical Advisory Assistance and Capacity Building support to the Liberia Revenue Authority	05.11.2018	30.03.2020	0.155	0	ONGO
Transport				164.38		
8	Paving Fishtown - Harper Road Phase I	04.09.2013	31.12.2020	42.04	26.0	ONGO
9	MRU Road Development and Transport Facilitation Project – Phase I	18.12.2014	30.06.2022	52.08	24.20	ONGO
10	MRU Road Development and Transport Facilitation Project – Phase I- additional Loan	03.06.2015	30.06.2022	24.80	13.8	ONGO
11	MRU – Road Development and Transport Facilitation Project Phase II	19.09.2018	31.12.2023	45.46	0	APVD
Multisector- Governance, Technical Assistance and Capacity Building				15.98		
12	Institutional Support for the Integrated Public Finance Management Project Phase II	30.01.2017	31.12.2019	6.26	1.2	ONGO
13	Economic Governance and Competitiveness Support Programme	31.07.2018	31.12.2019	7.0	4	ONGO
14	Technical and Capacity Building Assistance project to the Government of Liberia	13.09.2018	30.12.2020	1.0	0.3	ONGO
15	Liberia Youth Entrepreneurship and Employment Project	04.05.2016	30.06.2021	1.72	0.70	ONGO
Private Sector Finance				6.01		
16	Trade Finance Line of Credit Liberian Bank for Development and Investment	16.05.2018	TBD	6.01	0	APVD
TOTAL (UA million)				281.54	100.58	35.82%
TOTAL (USD million)				390	140	

Table E.5.2: AfDB's Active Portfolio in Liberia

Describe the selection process and related consultations undertaken to ensure the proposed project/programme reflects a broad spectrum of stakeholder views, including the approval process by NDA for providing the no objection letter and criteria used for selection of the proposed activities, with a particular emphasis on gender and ESS consultations. Details on the stakeholders' consultation carried out during the project proposal preparation can be reported as part of annex 2.

Briefly summarize the multi-stakeholder engagement plan and the consultations that were conducted when this proposal was developed.

Multiple stakeholders from ministries, departments, and agencies, including the Liberia meteorological and hydrological services, and private sector stakeholders, were engaged in a workshop to solicit their views and understanding about climate change. There were also meetings with major international stakeholders, including the WMO, UNDP, and AfDB, on cooperative strategies on climate adaptation and disaster response in Liberia. These meetings brought insight on past collaborative projects on climate adaptation, such as the Early Warning Systems project between the WMO and Liberia Ministry of Transport. There are plans for these international organisations and local government and private institutions to continue to collaborate in instituting a resilient climate environment across all sectors in Liberia.

Although there are climate-focused state agencies and units within departments that focused on championing public understanding of climate change as well as mitigation and adaptation strategies within the country, a recent Afrobarometer survey (Wongbe, 2018) indicates that more than half of Liberians have heard of climate change, with a majority reporting that climate change is making life worse in the country, while many are not aware of its causes. There is a knowledge gap in the country when it comes to climate risks, hazards, and associated vulnerabilities. This fact is further revealed in a survey conducted as part of the base assessment for this project. A recent survey of people in Liberia from different professions at ministries, departments, and agencies revealed a significant understanding of climate change variability (see Figure E.5.1).

8. How would you rate your understanding of climate change and variability?
30 responses

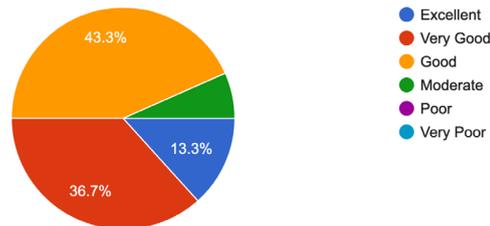


Figure E.5.1: Understanding of climate variability

A large number of respondents also indicated that they do not receive climate information. Most people also reported having direct experience with a climate hazard (Figure E.5.3). This shows how common the impact of climate hazard is among the populace. The major climate hazards reported from the survey are consistent with what is reported in the literature and the national policy documents. Flood, coastal erosion, and windstorm were the three most common climate hazards in Liberia (see Figure E.5.2), and the frequency of occurrence of these hazards is seasonal. Liberia also lacks the hydromet capacity to guide national planning in priority areas such as agriculture and food security, health, water resources, disaster risk reduction, energy, and transportation.

⁵² <https://www.undp.org/content/undp/en/home/about-us.html> (Assessed 20 Mar 2020)

⁵³ UNDP Transparency Portal. <https://open.undp.org/> (Assessed 21 Mar 2020)

9. Which of these climate-related hazards, in your opinion, affect Liberia the most?

30 responses

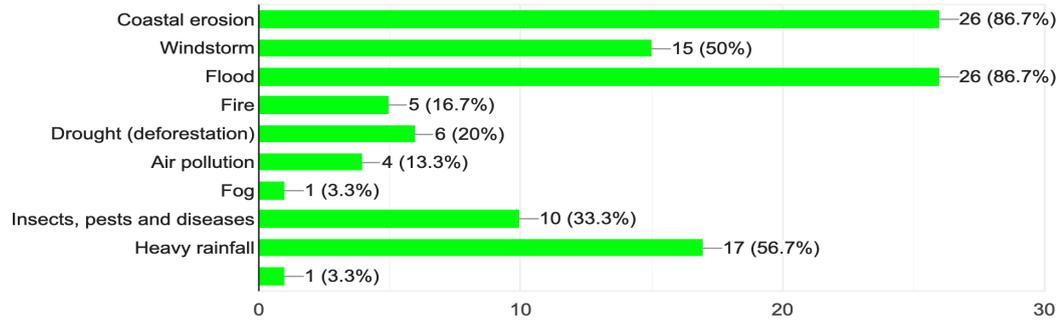


Figure E.5.2: Common climate hazards in Liberia

21. Have you/your sector/family/friends ever experienced any direct or indirect consequences associated with climate hazards such as flood, windstorm, sea erosion, etc?

30 responses

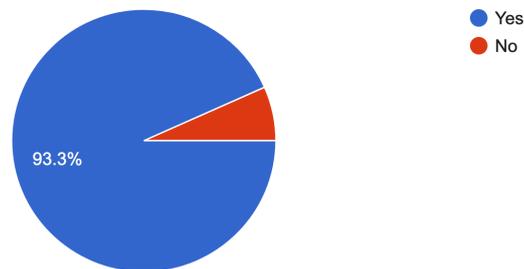


Figure E.5.3: Direct or indirect experience with climate hazards

There was also unanimity among respondents on whether or not climate hazards impact the different genders differently. The results (Figure E.5.4) revealed nearly all respondents acknowledging that there are different levels of climate impact on men and women.

23. In your experience/opinion, does specific hazards (sea erosion, flood, windstorm, fire, drought, etc) affect men, women, children, and the elderly differently?

30 responses

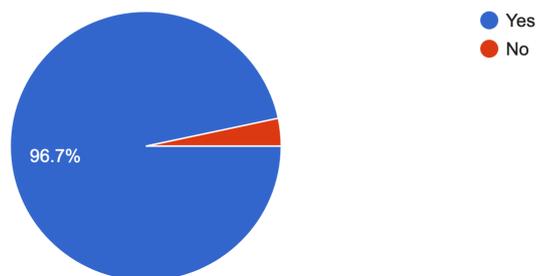


Figure E.5.4: Impact of climate hazards on different genders

Most respondents indicated that women and children are most vulnerable to climate hazards. Some of the reasons for this include that: their occupations are largely in the climate-vulnerable sectors; they do not have the economic resources to hedge the impact of climate hazards, among others.

E.6. Efficiency and effectiveness

E.6.1. Estimated cost per t CO ₂ eq, defined as total investment cost / expected lifetime emission reductions (Mitigation and Cross-cutting)	(a) Total project financing	US\$ _____
	(b) Requested GCF amount	US\$ _____
	(c) Expected lifetime emission reductions	_____ tCO ₂ eq
	(d) Estimated cost per tCO₂eq (d = a / c)	US\$ _____ / tCO ₂ eq
	(e) Estimated GCF cost per tCO₂eq removed (e = b / c)	US\$ _____ / tCO ₂ eq
E.6.2. The expected volume of finance to be leveraged by the proposed project/programme and as a result of the Fund's financing, disaggregated by public and private sources (Mitigation and Cross-cutting)	(f) Total finance leveraged	US\$ _____
	(g) Public source finance leveraged	US\$ _____
	(h) Private source finance leveraged	US\$ _____
	(i) Total Leverage ratio (i = f / b)	_____
	(j) Public source leverage ratio (j = g / b)	_____
	(k) Private source leverage ratio (k = h / b)	_____

E.6.3. (max. 500 words) Describe how the financial structure is adequate and reasonable in order to achieve the proposal's objective(s), including addressing existing bottlenecks and/or barriers, providing the minimum concessionality; and without crowding out private and other public investment.

The paucity of consistent and accurate information on the economic and financial assessment of climate hazards in Liberia limits the ability to estimate the potential impact of climate investment. This notwithstanding, detailed and rigorous computations provide an understanding of how to impact targeted investments, such as this project, can augment the level of accuracy of different future scenarios. A quantitative system dynamics model of Liberia was developed and simulated to ascertain the average annual cost of climate hazards and the number of people affected. The model made projections until 2040. The annual cost of climate hazards, with GDP as a proxy, is then taken as the future potential cash inflow of the project since recovery is made out of these annual losses (see Table E.6.1). Since the project requires investment to cater for the operational cost, the O&M cost is projected (see Annex 22_Post Project O&M Cost) and added to the initial project cost. This sums up to the overall project cost from 2021 to 2040. The matrix of discount rate and time resulted in multiple present values. These present values now reflect cash inflows while the project capital cost depicts the cash outflows. The four-time periods and four discount rates yielded a total of sixteen net present values. Out of this total, only three were found to fall within a financially viable region for the project. These are highlighted in green. The other thirteen net present values were negative (highlighted in orange) and are therefore not feasible cases for the project.

Table E.6.1: Shows a feasibility region within which the financial viability of the project becomes apparent

Period	Project cost	PV - 3,5%	NPV - 3,5%	PV - 5%	NPV - 5%	PV - 10%	NPV - 10%	PV - 15%	NPV - 15%
2025 (5 years)	\$20 273 975	\$1 213 496	-\$19 060 479	\$1 744 000	-\$18 529 975	\$3 488 000	-\$16 785 975	\$5 232 000	-\$15 041 975
2030 (10 years)	\$20 273 975	\$2 839 701	-\$17 434 274	\$4 067 150	-\$16 206 825	\$8 134 300	-\$12 139 675	\$12 201 450	-\$8 072 525
2035 (15 years)	\$20 273 975	\$4 971 586	-\$15 302 389	\$7 112 700	-\$13 161 275	\$14 225 400	-\$6 048 575	\$21 338 100	\$1 064 125
2040 (20 years)	\$20 273 975	\$7 728 361	-\$12 545 614	\$11 050 950	-\$9 223 025	\$22 101 900	\$1 827 925	\$33 152 850	\$12 878 875

This significantly addresses the lack of empirical data in Liberia, which makes the estimation of the potential cash flow based on a given amount of investment difficult. Rather than making extensive assumptions, the financial analysis in Table E.6.1 demonstrates a feasibility region within which the financial viability of the project becomes apparent.

For example, based on the present values calculated, it is observed that the project is financially viable at a discount rate higher than 5%. At 10%, the project becomes financially viable between ten to fifteen years. It is also viable after ten years and five years is 10%, and 15% of the present value of the annual.

F. ANNEXES

F.1. Mandatory annexes

- | | | |
|--------------------------|----------|---|
| X | Annex 1 | NDA No-objection Letter(s) (<u>Template</u>) |
| X | Annex 2a | Example project level logframe (<u>Example</u>) |
| X | Annex 2b | Example timetable (<u>Example</u>) |
| X | Annex 3 | Budget plan that provides a breakdown by type of expense (<u>Template in excel sheet</u>) |
| X | Annex 4 | Gender assessment and action plan (<u>Template</u>) |
| X | Annex 5 | Co-financing commitment letter |
| <input type="checkbox"/> | Annex 6 | Term sheet and evidence of internal approval |
| X | Annex 7 | Risk assessment and management (<u>Template</u>) |
| X | Annex 8 | Procurement plan model (<u>Template</u>) |
| <input type="checkbox"/> | Annex 9a | Legal Due Diligence (regulation, taxation, and insurance) (<u>Template</u>) |
| <input type="checkbox"/> | Annex 9b | Legal Opinion/Certificate of Internal Approvals (<u>Template</u>) |

F.2. Other annexes to be submitted when applicable/requested

- | | | |
|--------------------------|-----------|--|
| X | Annex 10a | Economic and financial viability CIS Liberia (mandatory for private-sector proposals) |
| X | Annex 10b | Financial Analysis CIS Liberia |
| <input type="checkbox"/> | Annex 11 | Appraisal, due diligence or evaluation report for proposals based on up-scaling or replicating a pilot project |
| <input type="checkbox"/> | Annex 12 | Environmental and Social Action Plan (ESAP) (<u>Template</u>) |
| X | Annex 13 | Pre-feasibility study |
| X | Annex 14 | Capacity and output sizing for the solar PV back up system |
| X | Annex 15 | Users and Stakeholder Analysis for the Climate Services |
| X | Annex 16 | AWS Procurement |
| X | Annex 17 | List of Acronymns |
| X | Annex 18 | Technical description of AWOS and weather radar system |
| X | Annex 19 | LNRC and IFRC Capacity building and training plan |
| X | Annex 20 | National Budget projection for EPA, MoT, NDMA and MME |
| X | Annex 21 | O & M Letter of Commitment from Liberia Airport Authority |



X Annex 22 Post Project O&M Cost

** Please note that a funding proposal will be considered complete only upon receipt of all the applicable supporting documents.*

No-objection letter issued by the national designated authority(ies) or focal point(s)



Office of the Executive Director

REPUBLIC OF LIBERIA
ENVIRONMENT PROTECTION AGENCY

P.O. Box 4024
4th Street Sinkor, Tubman Boulevard,
1000 Monrovia, 10 Liberia



ED/EPA-01/00099/20/RL

January 22, 2020

To: The Green Climate Fund (“GCF”)

Dear Madam, Sir,

Re: Funding proposal for the GCF by African Development Bank (AfDB) regarding Enhancing Climate Information Systems for Resilient Development in Liberia (Liberia CIS)

We refer to the project, Enhancing Climate Information Systems for Resilient Development in Liberia (Liberia CIS) as included in the funding proposal submitted by the African Development Bank to us on January 20, 2020.

The undersigned is the duly authorized representative of the Environmental Protection Agency, the National Designated Authority of Liberia.

Pursuant to GCF decision B.08/10, the content of which we acknowledge to have reviewed, we hereby communicate our no-objection to the project as included in the funding proposal.

By communicating our no-objection, it is implied that:

- (a) The government of Liberia has no-objection to the project as included in the funding proposal;
- (b) The project as included in the funding proposal is in conformity with Liberia’s national priorities, strategies and plans;
- (c) In accordance with the GCF’s environmental and social safeguards, the project as included in the funding proposal is in conformity with relevant national laws and regulations.

We also confirm that our national process for ascertaining no-objection to the project as included in the funding proposal has been duly followed.

We also confirm that our no-objection applies to all projects or activities to be implemented within the scope of the project.

We acknowledge that this letter will be made publicly available on the GCF website.

Kind regards,

Nathaniel T. Blama, Sr., *L.H.D., MPA*
EXECUTIVE DIRECTOR/CEO
NATIONAL DESIGNATED AUTHORITY

Secretariat's assessment of SAP018

Proposal name:	Enhancing Climate Information Systems for Resilient Development in Liberia (Liberia CIS)
Accredited entity:	African Development Bank (AfDB)
Country/(ies):	Liberia
Project/programme size:	Small (SAP)

I. Summary of the Secretariat's assessment

- The funding proposal is presented to the Board for consideration with the following remarks.

Strengths	Points of caution
Seasonal flooding, storms and related climate extremes, exacerbated by climate variability and change, presents a major challenge to Liberia's long-term development, with gross domestic product losses of 2 per cent a year expected to more than double by 2030. The project will enable Liberia to establish a robust climate information and early warning systems, to take timely action to reduce disaster risk and provide actionable impact-based information to highly weather-sensitive sectors such as agriculture, fisheries, health, logistics, aviation and transport in general. The project will directly benefit 177,289 people, and indirectly benefit the totality of the population.	Climate risk management in Liberia has traditionally dependent on donor funding. The proposal brings together these major donors/humanitarian agencies under one umbrella to enhance coherence and complementarity of interventions. It further seeks to establish the Liberia Climate Change Trust Fund that will enable effective mobilization of sustainable in-country and international investments to drive uptake an investment in climate information and early warning systems. Since this intervention is the first of its kind in the country, there will be the need for a strong oversight from the African Development Bank and the GCF secretariat.
The project adopts some of the innovative technologies, lessons, best practices and the World Meteorological Organization standards, with all equipment being compliant with Global Basic Observing Network requirements. The COVID-19 pandemic caused a reduction of about 80% of observing systems in the tropics to the global observing system. The project seeks to address this problem by adopting automated weather stations that will enable Liberia to provide uninterrupted critical weather data by minimizing human dependence.	The project will be among the early projects to contribute to the WMO-led Global Basic Observing Networks as well as benefit from the Systematic Observation Financing Facility that is being established. To maximize outcomes of the project in relation to these initiatives, WMO and partner oversight will be crucial.

<p>There is strong paradigm-shift potential with the introduction of impact-based forecasting and forecast-based financing, two innovative systems that together can help reduce risks and respond rapidly to climate-related disasters. Partnerships with key industries such as aviation for the use of weather information will provide revenue to finance the operation and maintenance of the equipment and systems.</p> <p>The project also seeks to establish a business delivery model that will ensure sustainability and scaling up of investments beyond the life-cycle of this project.</p>	<p>Establishing, operating and maintaining the impact-based forecasting and forecast-based financing will require a more focused institutional capacity and technical capacity. While the project contemplates adequate capacity-building, institutional coordination will need to be strengthened and monitored closely.</p>
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2. Liberia is a coastal, least developed country in west Africa, with a tropical climate characterized by high temperatures and high levels of rainfall, a rainy season between May and October, and a short dry season from December to February. The country is frequently affected by climate-related extreme events, predominantly droughts, floods, coastal erosion and sea-level rise, the combined costs of which amount to 2 per cent of gross domestic product (GDP) per year.

3. Climate change is expected to exacerbate climate impacts on the country, with an expected temperature rise of 1.5 °C in the period 2031–2060 compared to the 1976–2005 average (Representative Concentration Pathway 4.5), and up to 4,000 mm of rain in the coastal belt, compared to 2,450–2,782 mm in the period 1976–2005, whereas the inland areas are expected to become up to 30 per cent drier. These changes are expected to exacerbate climate change impacts, particularly in the coastal area. Economic costs are expected to increase from USD 55 million in 2021 to USD 136 million in 2030, and the number of people directly impacted by climate-related hazards is expected to more than double, from the current estimated 7,000 to 15,416 people.

4. Liberia’s capacity to prepare for and respond to such impacts is hampered by: incomplete knowledge of its vulnerability to climate hazards; inadequate capacity of institutions, such as the Liberian Hydrological Services (LHS) and Liberian Meteorological Services (LMS), to gather and process climate data for end users; insufficient capacity of individuals to plan adequately and respond on the basis of short-term and medium-term weather forecasts; and the lack of an effective response mechanism to distribute aid efficiently to affected communities. The National Disaster Management Agency (NDMA), set up in 2016, lacks the financial and logistical support to function as effectively as required by its mandate, limiting its ability to reach disaster victims.

5. The project is designed as a comprehensive intervention to build Liberia’s capacity on climate information services and risk management, with the goal to enhance the preparedness and response capacity of Liberia’s government and communities to climate change and related extreme events. In line with best practices and guidelines from the World Meteorological Organization (WMO), it proposes a multipronged approach comprising: improved knowledge of risks; enhanced weather-data collection, analysis and forecasting; improved communication of weather and warning information to users and communities; and, importantly, mechanisms to better prepare and respond to climate hazards through an adequate enabling environment, including legislation, agency coordination, impact-based forecasting and forecast-based financing.

6. The project builds on the work done by the project of the Global Environment Facility (GEF) Strengthening Liberia’s Capability to Provide Climate Information and Services to Enhance Climate Resilient Development and Adaptation to Climate Change, with a budget of USD 6,070,000. Implemented by the United Nations Development Programme, the project sought to improve national capacity to generate and use climate and weather information for disaster risk planning and management. It installed 11 automated weather stations, 6 agrometeorological stations, and 6 synoptic stations covering the most populated areas, while building the capacity of hydrometeorological services and associated networks to monitor and predict extreme weather, climate-related hazards, and climate trends. However, a complex institutional environment, with insufficient coordination among agencies, and insufficient attention to the tailoring and delivery of readily usable information, limited the success of the project.

7. The proposal has been designed incorporating lessons from the completed GEF project, placing a stronger focus on coordination between hydrological and meteorological agencies, and the development of supporting legislation using international standards and best practices. Most relevantly, it introduces, in the form of impact-based forecasting and forecast-based financing, two innovative systems that can help link, with the help of a vulnerability database, weather forecasts to plausible impacts and mobilize resources automatically before weather events. The new Liberia Climate Change Trust Fund (LCCTF) will be created to manage this process, a fund to be managed by the National Climate Change Steering Committee and financed through donor funding as well as a percentage of the cost recovery and revenue from climate information users such as the aviation and marine sectors.

8. The executing entity (EE) for the project is to be Liberia’s Environmental Protection Agency (EPA). The Secretariat has requested that the African Development Bank (AfDB) provide further details on the implementation arrangements to clarify how the agencies will work together, the role and status of collaborating partners such as the International Federation of the Red Cross, its Liberian counterpart, the World Food Programme (WFP) and the International Centre for Theoretical Physics, which would collaborate in the implementation of different activities.

**Table 1
Project financing**

Source	Amount (USD)	Use	Amount (USD)
GCF	10,000,000 (grant)	Enhanced disaster risk knowledge	589,500 (5.2%)
Government of Liberia	1,000,000 (in-kind)	Enhanced hazard detection, monitoring, analysis forecasting	5,490,997 (48.0%), of which USD 2.1m to enhance hydrometeorological observation network
African Development Bank	431,969 (grant)	Warning dissemination and communication	1,697,304 (14.8%)
		Legislation and forecast-based financing for disaster response and preparedness	1,921,268 (16.2%)
		Collaboration, knowledge management	1,082,900 (9.5%)
Total	11,431,969	Project management costs	650,000 (5.7%)

1.1 Component-by-component analysis

Component 1: Enhanced disaster risk knowledge of individuals and institutions across the country (total cost: USD 589,500, fully funded by GCF)

9. Component 1 will focus on addressing the lack of knowledge regarding climate risk, which is fundamental to understanding exposure to climate-related impacts and acting accordingly in disaster planning and response processes. The component will support NDMA with the development of risk management tools and guidelines, online geographical information systems to be used for climate hazard mapping, and the assessment of climate-related hazards and losses with consultations at the community level. This will result in the development of a database of historical disaster impacts, which will further help advise disaster risk reduction policies. At the community level, capacity will be built through community consultations to bridge the knowledge gaps on climate risk exposure and climate information needs, facilitated through the community-based action teams. The training activities under activity 1.2.2 build capacity for different purposes, predominantly weather observation, data analysis and modelling.

Component 2: Enhanced detection, monitoring, analysis and forecasting of the hazards and possible consequences (total cost: USD 5,490,997; GCF cost: USD 5,198,997, or 94.7 per cent)

10. Component 2, the largest of the project interventions at 48 per cent of the budget, aims to provide LHS and LMS with the equipment and capacity to adequately generate and analyse data, and to produce weather forecasts for use by Liberia's population and key industries. The lack of coordination between the two agencies was one of the key barriers to achieving results in disaster risk reduction that were identified during project preparation, and one of the reasons behind the less-than-optimal results of previous donor interventions.

11. To address this barrier, component 2 will strengthen the linkages of LHS and LMS through institutional capacity-building and the creation of an automated decision management system to create a robust hydrometeorological forecasting service that can inform decision-making and minimize exposure to hazards on the basis of weather information. Complementary legislation will be developed through activity 4.1 to create a semi-autonomous body, the Liberia Meteorological and Hydrological Service (LMHS), with a cost-recovery mandate.

12. On the data-collection side, the project will strengthen the meteorological and hydrological observation networks, with the installation of 40 automated weather stations (expanding on the 11 automated weather stations installed by the GEF project), including 20 agrometeorological and 20 hydrometeorological stations, expanding automated coverage beyond the more populated coastal area to reach the more sparsely populated interior. Twenty manual weather stations will be installed for calibration purposes, and air-quality systems will be procured for measuring common pollutants (nitrogen dioxide, nitric oxide, and ozone) as well as particulates (PM1, PM2.5 and PM10). At least one agrometeorological, hydrometeorological and manual station will be installed at suitable locations in each county. The equipment procured will be compliant with the standards of the Global Basic Observing Network, and able to operate without interruption, making it resilient against disruptions such as the current COVID-19 pandemic, other epidemics, conflicts, or extreme climate events.

13. Technical capacity and equipment will be provided to LMS and LHS through the creation of meteorological and hydrological laboratories for data analysis, feeding the different units within LMS (forecasting, observation and instrumentation, remote sensing and satellite, climatology, and agrometeorology) and LHS (groundwater and surface water assessment). Solar panels will provide a safe and sustainable source of energy to ensure continued operation of the laboratories. E-infrastructure required for weather and seasonal forecasting, data, and information management will be set up, along with an effective support system with innovative information and communications technology infrastructure for data transmission, storage,

processing, quality control, and visualization. The National Meteorological Centre building will be rehabilitated and equipped using co-financing from the AfDB.

14. Finally, in order to ensure adequate quality of data, maximizing available expertise, the component includes activities on quality management systems for the LMHS (ISO 9001) and the establishment of communities of practice.

15. As part of the project, LMS and LHS will incorporate operation and maintenance (O&M) costs for the meteorological and hydrological monitoring and data management equipment in their annual budgets presented to the Government of Liberia. While a cost-recovery programme has not been fully devised, EPA will identify potential clients for climate information services, including large-scale commercial farmers, fishing companies, aviation sector businesses, and neighbouring countries, such as Côte d'Ivoire, Guinea and Sierra Leone, to contribute to financing the agencies' operations. A percentage of the cost recovery and revenue will be deposited in a special fund for climate disaster events, the LCCTF, established in component 4.

Component 3: Improved warning dissemination and communication (total cost: USD 1,697,304; GCF cost: USD 1,617,835, or 95.3 per cent)

16. Component 3 will support the strengthening of the delivery of public weather services, enhancing the communication system for weather service delivery and timely communication of warnings about imminent weather and climate hazards to people and communities at risk.

17. The last-mile barrier was identified as a major gap in Liberia's climate information system. For the provision of weather services, GCF will provide technical assistance to conduct capacity-building, studies and on-the-ground surveys to design effective communication channels on the basis of the needs of communities and users, and monitor their effectiveness during project implementation. As a key communication channel, a public weather service studio for television broadcast will be set up.

18. For the provision of early warning and risk information, the project will combine an online approach, with the establishment of an LMHS information portal providing climate data, early warning and climate risk information to the general public and targeted stakeholders, with community-level activities to ensure adequate response at the community level. The project will support the setting up of a community-based early-warning-system communication mechanism, train LMHS staff on media relations to ensure a good user experience for hydrometeorological data users, and monitor the usefulness of the services received by communities. Six dialogues will be organized in communities vulnerable to climate risk to build awareness and understand the users' needs.

Component 4: Improved preparedness and response capabilities through legislation and a forecast-based financing mechanism (total cost: USD 1,921,268, fully funded by GCF)

19. Building on the enhanced risk knowledge supported by component 1 and the capacities built in components 2 and 3 on data analysis and early warning communications, component 4 will focus on improving the response capacity of the Government to disasters through forecast-based financing. Through this mechanism, innovative in the context of Liberia and following international best practices, funding will be ready for disbursement for the critical early relief phase before impacts take place, based on vulnerability-informed forecasts.

20. GCF will contribute USD 1 million to capitalize the LCCTF, which will be responsible for financing the forecast-based financing response, as well as to fund other climate resilience and, related climate change activities. The LCCTF will concentrate the funding and responsibilities of existing disaster response mechanisms, including leveraging the World Food Programme (WFP) early warning and planning funding (USD 4.8 million allocated to resilience planning and to cash transfers in the event of a climate disaster), the International Federation of the Red Cross (IFRC) and Liberia National Red Cross (LNRC) Disaster Relief and Emergency Fund, and the Liberia Disaster Management Trust Fund, set up in 2016 to strengthen disaster preparedness,

emergency response and mitigation. The LCCTF will be also capitalized by a percentage of the revenues from the users of weather services (see component 2), mainly large-scale farmers, aviation and marine industries, and donor funding.

21. AfDB will develop an LCCTF operations manual during the first year of implementation. The manual will detail the mechanisms for capitalization, governance structure and implementation arrangements, the fiduciary management process and the monitoring, reporting and verification process.

22. Activities 4.1 and 4.2 will focus on developing other enabling environment aspects to enable an adequate response to climate hazards, strengthening Liberia's disaster management framework, developing risk scenarios, and providing training and pilot-testing for the implementation of forecast-based financing.

Component 5: coordinated project management and implementation across all climate information service units in Liberia (total cost: USD 1,921,268; GCF cost: USD 348,400, or 32.2 per cent)

23. Finally, GCF technical assistance will support a number of activities aimed at strengthening project implementation by tying it in with the broader climate information landscape in Africa. Activity 5.1 will promote collaboration with other regional organizations in the sector, enable the participation of Liberia in Regional Climate Outlook Forums and that of LMHS in the WMO Severe Weather Forecasting Demonstration Project, and support study tours to relevant global and regional hydrometeorological institutions. Activity 5.3 will support the development of a transparent monitoring, evaluation and learning system that will offer stakeholders, including GCF, up-to-date and transparent information on the progress of the project.

II. Assessment of performance against investment criteria

24. The proposal, through outputs 1 to 4, aligns with the GCF objective of promoting the paradigm shift towards low-emission and climate-resilient development pathways, and the fund-level impact of increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions (A1), and outcomes measured by GCF indicators (A5 – Strengthened institutional and regulatory systems for climate and gender-responsive planning and development; A6 – Increased generation and use of climate information in decision-making; and A8 – Strengthened adaptive capacity and reduced exposure to climate risks).

2.1 Impact potential

Scale: N/A

25. Seasonal flooding has become one of the most devastating impacts of climate variability and change on the lives and livelihoods of the population of Liberia. For instance, in 2018, the country experienced extreme flooding that affected the counties of Margibi, Montserrado, Grand Bassa, Bomi, Sinoe, Grand Kru and Maryland. The situation was further exacerbated by the 2019 rainy season flood. NDMA estimates that about 44 per cent of the 52,726 affected persons in 2018 were females, 18 per cent children and 38 per cent males. Although the government tried to mobilize external resources to support the communities, the effort was not comprehensive enough to reach all those in need and provide a sustainable way of mitigating climate risks.

26. The project seeks to reduce the exposure of Liberia's communities, livelihoods and infrastructure to climate-induced natural hazards through a well-functioning, national, multi-hazard, impact-based forecasting and early warning system. It proposes to increase the resilience of communities by reducing the loss of lives, livelihoods and assets in two ways: (i) directly, through improved severe weather and flood forecasting and climate services for approximately 2,312,400 people (47.4 per cent women); and (ii) indirectly, through enhanced

service delivery of LMHS to approximately 5,395,600 people (49.7 per cent women) who largely depend on weather- and climate-sensitive sectors.

27. The proposal does not fully exploit the opportunity of the interventions to leverage the potential of the existing socioeconomic landscape (including the broader private sector space) and the demographic dividend of the country's youth. It will therefore benefit from a detailed analysis of beneficiaries disaggregated at the community level based on demographics. Such an analysis could be undertaken during project implementation to help shape implementation after the midterm review and future programming. This could also integrate the proposed impact evaluation to be conducted during implementation, which will help maximize the impact of interventions by refocusing attention on areas that need the most support.

28. In summary, the interventions are well structured to address the challenges identified and are fully aligned with the Paris Agreement, Sustainable Development Goals (SDG) – in particular, targets of SDG 13 – and Sendai Framework targets of: (i) substantially reducing national disaster mortality, aiming to lower the average per 100,000 national mortality rate compared to the period 2005–2015; (ii) substantially reducing the number of affected people nationally, aiming to lower the average figure per 100,000 compared to the period 2005–2015; (iii) reducing direct disaster economic loss in relation to national GDP; and (iv) substantially reducing disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience.

2.2 Paradigm shift potential

Scale: N/A

29. Liberia has virtually no fully functional national meteorological and hydrological services, as it is operating below the basic category defined by WMO. Its newly constituted NDMA is also barely functional. The one fundamental benefit of this project will be the provision of essential resources to collect data about climate change and to factor those into the national decision-making process in order to derive economic, social and environmental benefits. The Liberia Climate Impact Assessment Model, a system dynamics-based simulation model developed to assess climate impacts in Liberia highlights some potential co-benefits that can accrue as a result of reduced climate costs. The provision of infrastructure will improve the quality of climate data, strengthen impact-based forecasting, and inform forecast-based financing mechanisms.

30. The proposal has been developed based on the newly formulated strategic plans of LMS and the disaster management plans. It outlines how it will ensure legislation and policy frameworks are established to harmonize activities of LMS, LHS and NDMA to improve institutional effectiveness so as to drive uptake and investments in climate information and early warning services.

31. The proposal also seeks to establish a wireless communication system for data and information transfer using open-source tools. This innovation will ensure sufficient bandwidth for data exchange between the observation networks and the data centre. It will also facilitate dissemination of early warnings to the last-mile user communities.

32. The proposal has indicated that, currently, the country has no radar, making its civil aviation unable to fully provide robust aviation meteorological services to users of its airspace. The introduction of the radar technology will increase the utility of quality products/services for the aviation, marine and agriculture sectors, as well as for effective disaster management. It will also drive the potential for revenue generation to sustain the O&M of the hydrometeorological services and disaster management agencies.

33. The proposed approach adopts the best available science and technology standards of WMO, the United Nations Office for Disaster Risk Reduction and humanitarian agencies to establish a multi-hazard impact-based early warning system consisting of impact-based

forecasting and forecast-based actions. This approach has demonstrated significant reductions in disaster risks, including post-disaster poverty reduction and improved well-being.

34. The proposal indicates that it will establish a nationwide observation network compliant with the requirements of the Global Basic Observing Network, and a state-of-the-art data centre to improve the forecasting capability of the national hydrometeorological services. This will include an improved computational infrastructure and knowledge that will enable high-resolution forecasts/warnings at the intervention scale, accurately predicting extreme events, hazards and impacts. The system will also increase the lead time to allow time for better planning and responses. This will lead to better interventions that will secure lives, livelihoods and assets. This will be the first time that an in-depth implementation at scale of impact-based forecasting and forecast-based action has been realized in Liberia using state-of-the-art, high-performance computing infrastructure, data analytics and impact-based forecasting.

35. The proposal conceptually shows a significant shift from traditional thinking, and it is envisaged that this will lead to maximization of impacts on the ground through indicators aligned to the Paris Agreement and SDGs. The proposal indicates that it will support the implementation of the National Disaster Risk Reduction and Resilience Strategy of Liberia (2020-2030) by developing the adaptive capacity of the public sector to anticipate multi-hazard risks and impacts by strengthening interagency coordination and capacity of local actors. The proposal is also fully aligned with the four priorities of the Sendai Framework: (1) understanding disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment; (2) strengthening disaster risk governance to manage disaster risk; (3) investing in disaster risk reduction for resilience through public and private investment to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment; and (4) enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction.

36. The human capacity and broader meteorological capacity of Liberia are very weak. The country lacks experience in the provision and use of climate services and disaster management. It has not established the Global Framework for Climate Services. The proposal will therefore benefit from a long-term strategy on how it will build on Liberia’s human capacity, highlighting how it will partner with the University of Liberia and other technical institutions to ensure a critical mass of human capacity to sustain the investments.

2.3 Sustainable development potential

Scale: N/A

37. The majority of Liberians, especially women, depend on agriculture-related activities for their livelihoods. However, most rural households are food-insecure. Nationally, 80 per cent of the rural population are either moderately vulnerable (41 per cent) or highly vulnerable (40 per cent) to food insecurity. The most food-insecure groups are those involved in palm oil production and selling, followed by hunters and contract labourers.

38. Unemployment remains a major issue in Liberia, ranging from 80 per cent to 85 per cent of the working population (males: 77 per cent; females: 94.1 per cent). Sixty-eight per cent of employed Liberians work in the informal sector, without regular wages or benefits, and with significant gender disparities of 69 per cent males and 90.9 per cent females. Youth employment is also very low.

39. In 2016, Liberia recorded approximately USD 6.17 million in losses caused by climate disasters. This figure is expected to almost double in the next decade, and triple by 2040 under the baseline scenario.

40. The project proposes to strengthen national institutions (LMHS and NDMA) to produce robust sector-specific information climate information and early warning services for the

benefit of the most vulnerable in order to significantly contribute to reducing the loss in GDP. The proposal indicates (feasibility study) that if the proposed interventions lead to a scenario where the fraction of GDP loss decreases by a minimum of 25 per cent within five years, the annual losses (excluding social) can be eliminated. It further argues that the per capita income of Liberia is expected to increase steadily throughout the base period. In the baseline scenario, annual per capita income is estimated to increase from approximately USD 680 in 2021 to USD 934 by 2030 and USD 1,183 in 2040. Upon the successful implementation of this project resulting in outcomes equivalent to the 25 per cent, 50 per cent, and 75 per cent loss decrease scenarios, the annual per capita income in 2030 will be USD 973, USD 984 and USD 987, respectively.

41. The proposal seeks to strengthen the capacity of key institutions (government, private entities and communities) and create awareness of climate risk reduction strategies among the broader population. It proposes to support disaster risk reduction by promoting integration of climate and disaster risk considerations in local planning and programming in order to increase the adaptive capacity of communities. It proposes to adopt co-design and co-production of interventions by actively engaging both communities that are at risk and local decision makers in crafting warnings and planning early actions during the “window of anticipation”. These local-level activities will scale up initiatives on forecast-based early actions, including forecast-based financing.

42. The avoided costs from implementation of the proposed impact-based forecasting and forecast-based actions could unlock the potential to significantly reduce disaster risk in communities, and enable private sector and government business continuity during disasters. A WMO/World Bank (WMO-No.1153) global study on the utility of climate information and early warning systems shows that, on average, a USD 1 investment returns from USD 2 to USD 36. The 2015 United Nations Children’s Fund/WFP study *Return on Investment for Emergency Preparedness* found that pre-positioning of emergency supplies could yield returns on investments of 1.6–2.0 and generate significant time savings in response of 14–21 days on average.

43. The proposal also seeks to demonstrate COVID-19 co-benefits as part of the general health co-benefits that will emerge from the project by equipping national institutions to proactively avoid/manage impacts of pandemics such as COVID-19 through forecast-based actions. When forecast-based financing is combined with the early response to a climate shock and resilience/disaster risk reduction activities, the co-benefits are maximized. Empirical evidence from a study in Nepal in 2018¹ indicated that the implementation of a forecast-based financing approach would save USD 22 million when responding to an emergency of average size (175,000 affected people). The study also revealed that up to USD 34 and 42 kg of carbon dioxide emissions could be saved per dollar invested within 20 years, after deducting the investment cost.

44. The proposal will benefit from an extensive cost–benefit analysis for its infrastructure investments within the Liberian context as this is the first time such a system is to be widely deployed in the country. This should also be extended to assess the utility of the forecast-based actions, as has been demonstrated in other countries. This could be done during the second and third years of project implementation.

2.4 Needs of the recipient

Scale: N/A

45. Liberia has not fully recovered from its periods of civil war, ending in 2003. This is due to its prevailing fragile sociopolitical and economic conditions resulting from its weak human,

¹ WFP. 2019. *Forecast-based Financing in Nepal: A return on investment study*. Available at <<https://docs.wfp.org/api/documents/WFP-0000108408/download/>>.

institutional, technological, financial, infrastructure and other capacities. The situation has been further complicated by the country's high vulnerability to climate variability and change, and its low adaptive capacity.

46. The impact of climate change on priority sectors – agriculture and food security, health, energy, water resources, forestry and wildlife, coastal areas, fisheries, mining, industry, transport and tourism – has increased over time. The associated impacts include increased crop loss due to extreme weather events and more pests, weeds, and pathogen attacks, which have negatively reduced agricultural production and pose a risk to food security as well as increased risk of vector-, air- and water-borne diseases.

47. The impacts of climate change on women are expected to be significant because they are the dominant users of natural resources (land and water) at the household level in Liberia. Women, children and youth are described as the groups most vulnerable to the effects of climate change, and gender has a critical role to play in the proposed Pro-Poor Agenda for Prosperity and Development of the Government of Liberia. There is a critical challenge of livelihood vulnerability to climate change across Liberia due to its dependence on climate-sensitive sectors such as agriculture, forestry and artisanal fishing. These sectors are where most females in the country earn a living, either through formal employment or self-employment.

48. The proposal argues that, by providing climate information and early warning services, it will enable the sustainable development of these climate-sensitive sectors and significantly contribute to reducing climate risk to lives, livelihoods and assets as well as the GDP gap. It seeks to contribute to addressing the needs identified in the Pro-Poor Agenda for Prosperity and Development of the Government of Liberia and the nationally determined contribution.

49. The proposal will benefit from an extensive national campaign strategy to create awareness of climate risk to lives and livelihoods in the country. In this strategy, it will need to make a deliberate effort to support civil society organizations and the broader non-governmental stakeholders in order to energize government to ramp up climate action at the grass roots. This will ensure that the needs of the most vulnerable recipients are well articulated in the implementation of the project.

2.5 Country ownership

Scale: N/A

50. The proposal has been built on materials developed through the GCF national adaptation plan and readiness programmes. It has derived its interventions based on the Pro-Poor Agenda for Prosperity and Development of the Government of Liberia, nationally determined contribution, national adaptation plan, and the national hydrometeorological and disaster management strategies.

51. The proposal is fully aligned with targets of SDG 13 on climate action by seeking to: (13.1) strengthen resilience and adaptive capacity to climate-related hazards and natural disasters; (13.2) integrate climate change measures into national and subnational policies, strategies and planning (including a national adaptation plan, nationally determined contribution, national communication, national development plan and disaster management plans); (13.a) mobilize resources through both internal and external partnerships towards implementation of the Paris Agreement as evidenced through the co-financing and other means for the successful implementation of the project; and (13.b) promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities.

52. Currently, most of the core expertise will be internationally sourced due to the acute capacity gap in the country. The participation of research and academic institutions is not well

established. There is an opportunity to explore the engagement of the Liberian diaspora in the project's implementation, as has been done in other countries. The proposal will benefit from further capacity assessments (e.g. impact evaluation) across the core components of the project in order to develop a capacity development programme that will ensure the critical mass of local expertise needed to sustain the investments during and beyond the life cycle of GCF interventions.

2.6 Efficiency and effectiveness

Scale: N/A

53. The proposal outlines how it will adopt innovative technologies such as the cloud, Internet of Things and big data analytics to improve the quality of provision and delivery of climate information and early warning services to drive performance and drastically reduce O&M costs. It is well established that these proposed technologies improve performance and drive down costs.

54. There are also significant improvements possible in efficiency and effectiveness with the use of impact-based forecasting and forecast-based actions in mitigating against climate and related risks. It is further envisaged that the interventions aimed at policy and legislative reforms will drive uptake and investments in climate information and early warning systems, particularly in the private sector.

55. However, these benefits and improvements can only be realized through effective planning, programming and coordination.

56. The financial structure for the proposal is justified for a highly vulnerable country (climate risks, and financial and economic situation) and a priority adaptation intervention. GCF grant financing is appropriate because the project is not revenue generating, and the outputs generated will be public goods.

57. The proposal will benefit from an extensive financial assessment to explore revenue-generation opportunities, such as from the aviation, marine, financial/insurance and transport sectors, to comprehensively quantify the broader benefits of the interventions. Although the proposal outlines how it will blend funds from existing sources, it should also further explore potential sources of national funds (e.g. private sector investments) that could be mobilized to sustain and scale up the investments. This could be done during project implementation.

III. Assessment of consistency with GCF safeguards and policies

3.1 Environmental and social safeguards

Does the project comply with the GCF Environmental and Social Policy?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Does the project have minimal to no environmental and social safeguards risks compatible with SAP?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

58. The project is expected to make a positive contribution to environmental and social benefits by laying the foundations for accurate predictions in the areas of flood management, agriculture and fisheries, as well as better ecosystem conditions through improved soil, air and water quality. The project is also expected to improve the health, safety and security of the people and communities that are considered most vulnerable and will be affected by climate-induced events. The Secretariat confirms the project's category C classification and that it is eligible under the simplified approval process scheme.

59. The project proposes: office and equipment rehabilitation; installation of manual weather stations, and air-quality systems to measure common pollutants such as nitrogen dioxide, nitric oxide, and ozone, as well as the particulates PM1, PM2.5 and PM10; construction of an operational centre; installation of a 142 kilowatt-peak solar systems, including storage for continuous power supply; and the establishment of meteorological and hydrological laboratories, among others. In view of these proposals, the AE has developed an environmental and social action plan to manage the minor risks and impacts that the project may entail.

60. These risks and impacts of the proposed activities may include occupational health and safety risks to workers (due to electrical hazards, trips and falls) related to construction and to the generation of construction-related solid wastes/debris during renovation/construction of operational centres and other structures, as well as to the generation of liquid wastes (e.g. spent laboratory chemicals) during operation of the environmental monitoring laboratories. The construction work may also cause temporary nuisance noise to the nearby communities. However, the activities will not involve new acquisition of land for the installation of the structures/equipment. To mitigate the risks and impacts, the project will require contractors to provide occupational health and safety plans for workers. These plans will be integrated into the procurement terms of reference. The management plans will also include the provision of on-site first-aid kits and the distribution of personal protective equipment, as well as workplace health and safety training for workers.

61. Stakeholder engagement through dialogues and workshops was undertaken during the preparation stage of the project. Several project activities will also require further consultations during implementation. The environmental and social action plan also includes a stakeholder engagement strategy to identify the various stakeholders at the national, local and district levels, including climate information institutions and relevant sectors (e.g. agriculture, transport and environment), as well as those from the civil society, the private sector and community-based organizations, such as farmers cooperatives, including women and youth groups that will be engaged by the project.

62. The AE has conducted screening to ensure that there are no indigenous peoples on proposed project sites.

63. A grievance redress mechanism will also be established at the project level, in addition to the AE's institutional-level grievance mechanism, that will be available to affected or potentially affected people and communities.

3.2 Gender policy

Does the project comply with the GCF Gender Policy?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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64. The AE has submitted a gender assessment and gender action plan and therefore complies with the requirements of the gender policy of the Fund.

65. The assessment indicates that Liberia has several legal and policy initiatives that tries to ensure gender equality and the empowerment of women. It has ratified international convention such as the Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW) and the also regional ones such as the African Charter on Human and Peoples Rights of Women in Africa. The Ministry of Gender, Children and Social Protection (MGCSP) is established and has developed a National Gender Policy and developed an Action Plan. The Environmental Protection Agency has developed the Climate Change Gender Action Plan for Liberia which seeks to ensure the mainstreaming of gender into Liberia's climate change policies, programs, and interventions so that women and men have equal opportunities to implement and benefit from mitigation and adaptation initiatives.

66. The assessment indicates that there is a critical challenge of livelihood security as vulnerability to climate change exists across Liberia. This is due to the people's dependence on climate change sensitive sectors such as agriculture, forestry and artisanal fishing. These sectors provide the major livelihood opportunity through formal and informal means to many Liberian communities including women. Agriculture sector contributes over one-third of the country's GDP and employs the most people and is mostly rain fed and subsistent in practice. Activities within the agriculture sector is structured along gender-based norms and division of labor at the household level which renders women more vulnerable than men to the impacts of climate change induced hazards. The assessment indicates that women employed in the agriculture sector exceeds that of men with a designated role of ensuring household food security and building resilience to shocks and stresses. There are also complementarities in roles between women and men for example, men clear land, women plant, tend crops and men harvest and market crops. Despite women's contribution and role, women tend to have less access than men to climate information, that could enhance women's resilience to the negative impacts of climate change. The assessment further indicates that the productivity of land managed by women is lower, with less land tenure and investment in land. Further women have less access to and use of agricultural inputs, including improved technologies; less access to market and credit and human and physical capital with additional constraints related to farm management.

67. Natural disasters and drought affect women and men differently. Women particularly face additional challenges during such times as they are responsible for their household water and energy needs which become scares and require additional time and effort. Natural disasters such as flooding, can leave in its wake a water-borne disease epidemic that affect women and men differently as a result of differentiated roles and responsibilities. In the same way drought, can create adverse outcomes that affect men and women differently. Responsibility of collecting water and fuelwood/energy resources lies with women, who tend to suffer the most in the wake of disasters that cause stress in the access to these services. Time burden will also increase as a result of droughts, where women and girls will have to walk long distances to fetch water and collect fuel. This, coupled with the transportation challenges such as traveling to the market to sell farm produce and buy foodstuff for household consumption, highlights the level of depth that women and children are at risk in the event of climate hazards. While information has been provided in the gender assessment on the differentiated impacts of climate change on women and men, the assessment indicates that there is scarcity of data regarding the differentiated needs and level of access to weather and climate information to women and men to mitigate and make informed decision on climate induced hazards.

68. The AE has provided a gender action plan and therefore fulfils the requirement of the gender policy. The gender action plan includes activities, indicators, targets, budget, timelines and gender expertise who will support with the implementation of the gender action plan. The gender action plan includes as a matter of priority the conduct of an in-depth gender situation analysis to determine in the two districts, the climate information needs of women and men, the access and use of weather and climate information as well as determine the appropriate channels for information sharing and dissemination. Activities will address the climate information needs (flood, storm and coastal surge warnings) of also women through trainings and attending meetings and provision of dissemination of weather and climate information; ensure policies and decision making systems are inclusive of women's views and needs while at the same time invest in developing capacities of relevant institutions to be gender responsive in their early action protocols and standard operating procedures.

3.3 Risks

3.3.1 Overall programme assessment

69. GCF is requested to provide a grant of USD10 million to reduce exposure to climate-induced natural hazards through a multi-hazard, impact-based forecasting and early warning system. The Government of Liberia is to provide an in-kind contribution of USD 1 million, and the AE is to co-finance a grant of USD 0.4 million.

70. Liberia is a least developed country. The project envisages that the forecast-based financing mechanism may provide service at a fee to industries such as mining, aviation and large-scale commercial agricultural enterprises. However, all revenues will be generated on a cost-recovery basis for operational expenses once the initial investments have been carried out. The AE has stated that the climate information services are not meant to be commercial services that will provide any commercial profits and, accordingly, has requested full grant financing.

3.3.2. **Accredited entity/executing entity capability to execute the current programme (medium)**

71. The AfDB has an extensive track record in the region. The AE has managed hydrometeorological and climate risk interventions worth over USD 100 million in the region and about USD 3 million over the last three years in Liberia.

72. EPA is to be the EE of this project. It has managed projects financed by external donors with budgets ranging from USD 3 million to USD 7 million. It will closely coordinate with three technical departments related to meteorological and hydrological services, and disaster management. The AE is still to carry out the capacity assessment of the EE.

3.3.3. **Project-specific execution risks**

73. Operation and maintenance risk: More than 50 per cent of the proposed GCF financing (USD 5.1 million) will be used to improve climate information systems or purchase the necessary equipment under component 2. Therefore, continuous O&M will be critical during and beyond the project implementation to achieving the climate impact. However, the O&M financing plan is yet to be finalized. The funding proposal states that the participating departments will integrate the O&M costs into their budgets and submit them to the Government of Liberia. Moreover, the memorandum of agreement will be executed between the relevant government agency and local governments/institutions to ensure the security and operation of the facilities.

74. Management of the trust fund: the project will establish the LCCTF, and USD 1 million of GCF resources will be used to capitalize it. While the eligibility criteria have not yet been shared, it is necessary that the activities to be funded under the LCCTF be aligned with the project activities. The funding proposal provides brief information about the manager, steering committee, replenishment plan and two other major financial instruments linked to forecast-based financing and disaster management. The LCCTF is envisaged as complementing the existing mechanisms. However, the project will benefit from more detailed plans in terms of governance structure, eligible activities, government commitment to sustain the LCCTF, and complementarity with other financial instruments.

75. Governance risks: the funding proposal identifies leadership change and political commitment as potential risks for the project. The project requires consistent political support to coordinate with different agencies in the government. Leadership change and/or a lack of political commitment may lead to delays in implementation and, consequently, reduced progress.

76. Economic and financial viability: the project shows a positive net present value at a discount rate of 5 per cent. At a discount rate of 10 per cent, the project becomes financially viable in 10–15 years. However, the funding proposal notes that the analysis is limited due to the lack of consistent and accurate information related to climate hazards in Liberia.

3.3.4. GCF portfolio concentration risk (low)

77. In the case of approval, the impact of this proposal on GCF portfolio concentration in terms of results areas and the single proposal is not material.

3.3.5. Compliance risk (medium)

78. The AE (AfDB) has advised that, to the best of its knowledge, it is not aware of any individuals, executing entities, beneficiaries and/or implementing entities that are subject to United Nations Security Council (UNSC) resolutions. The AfDB will conduct further assessments as part of its risk and fiduciary capacity assessment.

79. AfDB has confirmed that there will be no planned disbursements or distribution of cash, vouchers, commodities, or other items of value directly or indirectly to beneficiaries as part of any activities in this project.

80. AfDB has advised that it has Due Diligence Guidelines and Screening Procedures for AML/CFT and CIFFs, and provides guidance on mainstreaming AML/CFT and CIFF measures in its internal operations and activities. The AfDB will apply the same procedures for assessing AML/CFT and CIFF risks for this project. The screening tools to be used will include the ITR, PEP Check Tool, Accuity, Lexis Nexis, Google Advance and other open source search tools.

81. AfDB has several guidelines to ensure the project implementation process adheres to fiduciary standards. There is a PAR for the project, which should outline all the necessary steps taken by the AfDB. In the 'General Conditions' applicable to loan and grant agreements, it is required that all projects and sub-project accounts be audited each year (Internal and External) following the relevant generally accepted standards. The AfDB's primary monitoring tools, including post-procurement reviews (PPRs) procurement audits (PAs), independent procurement reviews (IPRs) and other miscellaneous reviews, will be part of the project.

82. AfDB has advised that mechanisms for the reporting of complaints or allegations of wrong-doing within the project and its activities (i.e. whistle-blower programme) will be ensured in accordance with its Whistleblowing and Complaints Handling Policy.

83. AfDB advised that there are no regulatory or legal restrictions that might hinder or prevent the Executing Entity (EE) from fully performing its obligations under the project.

84. Recommended risk rating: The Office of Risk Management and Compliance (ORMC)/Compliance Team has conducted a review of the project in accordance with relevant GCF Board approved policies and does not find any material issue or deviation with respect to compliance issues. Based on available information for this funding proposal, the ORMC/Compliance Team have determined a risk rating of 'medium' and has no objection to this request proceeding to the next steps for processing.

3.3.6. Recommendations

85. It is recommended that the Board consider the above factors in its decision.

Summary risk assessment		Rationale
Overall programme	Medium	The success of the project depends on steady support from the Government to coordinate with other agencies, and approval of budget allocation for the continuous operation and maintenance.
Accredited entity/executing entity capability to implement this programme	Medium	
Project-specific execution	Medium	

GCF portfolio concentration	Low	The trust fund being capitalized with GCF resources will have eligibility criteria aligned with project's activities.
Compliance	Medium	

3.4 Fiduciary

Does the project comply with the GCF AE fee policy?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
In case the EE (ies) is different to the AE, has the financial management capacity assessment of the EE (ies) undertaken?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

86. The EE for the project is to be EPA, while the AE will be the AfDB.
87. The AfDB, as the AE, will oversee, supervise, manage and monitor the GCF-approved project. In addition, it will provide constant advice and guidance to the entities that will implement the project in terms of technical aspects, fiduciary requirements, environmental and social aspects, and monitoring and evaluation. The AfDB will have overall responsibility and oversight for the project in line with the accreditation master agreement.
88. EPA, as the EE, will head a project implementing unit that will coordinate the implementation of the project, and will consist of three technical departments (LMS, LHS and NDMA), the project manager and project staff. The role of the three technical departments will be to provide technical support to the project implementing unit.
89. Under the technical guidance of EPA and expert working groups, the project management unit will be responsible for the overall execution of the project, the timely completion of project activities, financial oversight, and the attainment of expected results.
90. GCF will transfer funds to the AfDB's GCF account. The AfDB will then sign a grant agreement with the Ministry of Finance and Development Planning on behalf of the Government of Liberia. The AfDB will create a special account for GCF proceeds in order to undertake the funded activity as approved by the GCF Board. Disbursement of the proceeds for the project will be in accordance with the terms and conditions of the funded activity agreement and the grant agreement as well as with the provisions of the AfDB Disbursement Handbook.
91. Disbursement of the GCF proceeds will take the form of either: (i) the special account method (for operating expenses, payment of project staff, and certain workshop related expenses); or (ii) the direct payment method for the payment of works, goods and service contracts. For the operating and administrative expenses, a Liberian dollar-denominated special account under the responsibility of EPA will be opened at a local bank deemed acceptable to the AfDB; whereas for large procurements such as automatic weather stations, the AfDB will undertake the procurement directly.
92. The rules and procedures of the Government of Liberia, GCF, AfDB and EPA will guide the financial management and procurement of the project. The AfDB's primary monitoring tools, including post-procurement reviews, procurement audits, independent procurement reviews, and other miscellaneous reviews, will be part of the project.
93. Further to the post-procurement reviews, procurement audits, and independent procurement reviews, the project will also conform to donor reporting requirements and will prepare the annual performance report, midterm review, and project completion report, as well as other periodic reports, such as quarterly technical and financial reports, on time.
94. Confirmation that the EE has undergone appropriate due diligence and capacity assessment as per the AE's own policies and procedures, as well as provision of a satisfactory budget, is also required and as such it is recommended that these are conditions for the project.

3.5 Results monitoring and reporting

Is the project in line with the GCF Monitoring and Accountability Framework?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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95. As an adaptation project, the intervention aims to strengthen the resilience of communities, livelihoods and infrastructure through improved climate information systems.

96. The log-frame as presented in the funding proposal contains the basic elements of results monitoring and reporting but does not adequately fulfil GCF requirements. There are a number of issues to be addressed in order to enable it to facilitate results monitoring and reporting. There has been inconsistency in terms of selection of results areas and their reflection in the log-frame. Similarly, the midterm and final targets, particularly in terms of fund-level impacts, relate to the whole lifespan, which is not desirable. Rather, they should be limited to the project implementation period, and this needs to be reflected accordingly in the log-frame. In addition, the baseline, targets and assumptions need to be revisited and better articulated to allow for the timely and adequate monitoring and reporting of anticipated results.

97. The project-level results indicators need to reflect the changes that are the expected benefits that the beneficiaries are supposed to derive through the intervention. This would require qualitative assessments to aid quantitative indicators, as the quantitative information alone does not provide a real indication of the benefits of climate change interventions being supported by the project. Hence, a balanced approach of using both qualitative and quantitative indicators would be desirable in order to facilitate delivery of anticipated results in line with GCF requirements.

98. The review team recommends the addition of the following condition in the term sheet:

99. Covenant for the baselines/targets/means of verification to be defined and further developed in a revised log-frame based on the comments provided by the Secretariat before execution of the funded activity agreement.

3.6 Legal assessment

Has the AE signed the accreditation master agreement (AMA)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <u>Date of AMA execution:</u> 11/8/2017
Has a bilateral agreement on privileges and immunities been signed with the country where the proposed project/programme will be implemented?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Has a certificate of internal approval been submitted?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

100. The Accreditation Master Agreement was signed with the Accredited Entity on 8 November 2017, and it became effective on 7 November 2019.

101. The Accredited Entity has not provided a legal opinion/certificate confirming that it has obtained all internal approvals and it has the capacity and authority to implement the project. It is recommended that, prior to submission of the Funding Proposal to the Board (a) the Accredited Entity has obtained all its internal approvals and (b) the Fund has received a certificate or legal opinion from the Accredited Entity in form and substance satisfactory to the Fund confirming that all final internal approvals by the Accredited Entity have been obtained and that the entity has the authority and capacity to implement the project.

102. The proposed project will be implemented in the Republic of Liberia, a country in which GCF is not provided with privileged and immunities. This means that, amongst other things, GCF is not protected against litigation or expropriation in this country, which risks need to be further assessed.

103. The Secretariat and the Government of Liberia have not yet engaged in negotiation of an agreement on privileges and immunities.

104. The Heads of the Independent Redress Mechanism (IRM) and Independent Integrity Unit (IIU) have both expressed that it would not be legally feasible to undertake their redress activities and/or investigations, as appropriate, in countries where the GCF is not provided with relevant privileges and immunities. Therefore, it is recommended that disbursements by the GCF are made only after the GCF has obtained satisfactory protection against litigation and expropriation in the country, or has been provided with appropriate privileges and immunities.

105. The Accredited Entity has indicated that it has not completed due diligence of the legal status of the Environmental Protection Agency (EPA), an entity identified in the Funding Proposal to implement the project, and that the Accredited Entity will do the necessary due diligence after the GCF Board approval of the project. Pursuant to the AMA, as part of its preparation of the Funding Proposal, the Accredited Entity has the obligation to carry out all necessary or desirable due diligence including legal due diligence in relation to the Funding Proposal and submit the Funding Proposal to the GCF reflecting such due diligence conducted. The Accredited Entity is required to complete legal due diligence to the satisfaction of the GCF Secretariat.

106. In order to mitigate risk, it is recommended that any approval by the Board is made subject to the following conditions:

- (a) Delivery by the Accredited Entity to the Fund of a certificate or legal opinion within 180 days of the Board approval confirming that it has obtained all its internal approvals;
- (b) Signature of the funded activity agreement in a form and substance satisfactory to the Secretariat within the later of 180 days from the date of Board approval or the date on which the Accredited Entity has provided a certificate or legal opinion confirming that it has obtained all its internal approvals; and
- (c) Completion of legal due diligence to the satisfaction of the Secretariat including provision of a due diligence report to the Secretariat on the legal status of the EPA, role of the EPA in the project implementation and the proposed contractual arrangement with the EPA for the implementation of the project.

Independent Technical Advisory Panel's assessment of SAP018

Proposal name:	Enhancing Climate Information Systems for Resilient Development in Liberia (Liberia CIS)
Accredited entity:	African Development Bank (AfDB)
Country/(ies):	Liberia
Project/programme size:	Small (SAP)

I. Assessment of the independent Technical Advisory Panel¹

1.1 Impact potential Scale: N/A

1.1.1. Adaptation Impact

1. The proposed project seeks to improve Liberia's climate resiliency through the enhancement of disaster risk knowledge, rehabilitation of the climate and water monitoring and analysis systems, improvement of the warning dissemination and information systems, and improvement of preparedness and response capabilities.
2. Component 1 would improve disaster knowledge management through the development of guidelines for the generation of meteorological and hydrological information, risk modelling to assess the potential impact of climate-related hazards, the establishment of an internet-based geospatial platform, an assessment of climate-related hazards and losses, the definition of Community-Based Actions (CBATs), and technical training for staff of the involved national agencies on services and instrument maintenance and calibration.
3. The proposal did not include a definition of what is meant by CBATs. Questioned by the independent Technical Advisory Panel (TAP), the AE described CBATs: *"The community-based approach of Liberian National Red Cross Society (LNRCS) is rooted in the use of existing skills, and competencies at the community to promote sustainability, participation and ownership. CBAT is a grass-root structure of LNRCS volunteers which has the following responsibilities: a) Leading community actions to plan for and deal with disaster and or health risks at the community level with strong technical support of the LNRCS field teams; b) Work in close conjunction and collaboration with existing community-based organizations to plan and carry out safety and resilience actions in the community; c) They are the voice of the community- engage in Advocacy, Education and awareness-raising activities within the community; d) Monitor disease trends and refer to nearest health facility; and e) Follow up with health and disaster threats and report same."*
4. Component 2 is focused on improving the capabilities for hydrological and meteorological monitoring, analysis and communication. It involves the development of an automated decision management system for climate services, the installation of meteorological, hydrological and environmental monitoring labs, and the rehabilitation of the hydro-meteorological observation networks and the forecast and observing office of the National Meteorological Centre. Observation equipment includes twenty agro-meteorological stations,

¹ This assessment is based on the funding proposal (FP) submitted to the independent TAP on 2020/08/18, version V.008, and the responses to the independent TAP's questions provided by the Accredited Entity.

twenty hydro-meteorological stations, twenty manual weather stations, air-quality systems for measuring common pollutants, and weather radar at the Roberts International Airport.

5. The project would also support the Liberian Meteorological Service in the adoption of the ISO9001:2015 quality standard.

6. To enhance the dissemination of climate information, the project would develop weather and seasonal information products for priority sectors, and establish the required E-infrastructure for weather and seasonal forecasting, and data and information management, including infrastructure for data transmission, storage, processing, quality control, and visualisation. It would also create a community of practice (CoP) in operational numerical weather, seasonal prediction and forecasts verification, and development, use, and management of information and E-infrastructure.

7. Component 3 would enhance the early warning dissemination and communication of weather information. The project would invest in creating an information portal for the Liberian hydrological and meteorological services and in establishing a public TV studio to broadcast weather forecasts and communicate early warnings. To support the implementation of a community-based early warning communication mechanism, activity 3.2.2 would develop communication guidance and Communication Action Response Plans (CARPs), facilitate a Seasonal Participatory Scenario Planning, generate information, education and communications materials in multiple local languages, conduct workshops to promote disaster risk reduction awareness and behaviour change, and establish an Emergency operations Centre.

8. It is not clear what is the motivation for the project to provide technical training on Internet of Things (IoT), being that the systems to be implemented are of a much basic nature, which would make use of more traditional means of digital communication. The independent TAP considers IoT is beyond the reach of the present proposal.

9. Component 4 would enhance preparedness and response capabilities through institutional strengthening, policy development, capacity building and creation of a climate fund assigned exclusively to respond to climate-related disasters through the Forecast-based Financing (FbF) mechanism.

10. The project would support the implementation of FbF through related capacity building, inter-agency collaboration, pilot testing, consultations at national level, and through providing support for the development of Standard Operation Procedures (SOPs) for early actions.

11. The creation of the Liberian Climate Change Trust Fund would complement the existing financing sources for the implementation of early actions.

12. Component 5 involves project management and implementation.

13. The main objective of the project is to enhance the generation and use of climate information so as to allow informed adaptation measures, planning, and improved preparedness and response capabilities.

14. There are several donor projects aimed at strengthening the capacities of the meteorological and hydrological services, which are currently ongoing or under preparation.² The proposal should ideally present a clear and detailed description of the complementarity between the present proposal and other recently finished, ongoing or under preparation projects involving the Liberia Meteorological Service (LMS) and the Liberia Hydrological Service (LHS), in terms of capacity building activities and procured equipment, to guarantee the project would not be duplicating efforts.

15. The proposal assumes that project interventions would be benefiting 20% of the national population by 2030 and 30% by 2040. This is based on the argument that the impact

² Feasibility study, page 21.

measured at the end of the fifth year would not truly reflect the full impact of the project due to the delayed time lapse between activity and results.

16. The proposal states that *“The projected number of people who will be directly impacted by climate hazards under the 75% loss increase using only the 2006 fractional GDP loss as a proxy for the cost of climate hazards is estimated at 177, 289, equivalent to 2.3% of the total population.”* It is not clear how this 2.3% ends up in 20% of the total population by 2030 and 30% in 2040. The expected coverage of the hydro-meteorological equipment to be procured and installed by the project is not analysed in the proposal. Questioned by the independent TAP on this matter, the AE responded that *“A simulation model was developed mainly to assess the economic losses based on fractional (0,2%) GDP losses year (2006 used as the base year), and the reported incidences of people directly affected. This analogy however does not capture direct environmental and social cost. That is why it is stated in the pre-feasibility study that the scenarios assessed are only based on direct economic impact. The 20% total direct beneficiaries, which takes into account both environmental and social impact, was projected using data from Liberia Labour Force Survey (2010), National Disaster Management Policy (2012), the National Policy and Response Strategy on Climate Change (2018) and the Liberia Red Cross.”* Calculations made to estimate direct beneficiaries remain unclear.

1.2 Paradigm shift potential

Scale: N/A

1.2.1. Innovation

17. As explained in the proposal, the project’s main focus is to upscale the existing hydro-meteorological infrastructure provided in previous projects.³

18. However, the significant optimization the project would create in relation to climate and weather information generation, together with the institutional strengthening and the integration of climate and weather information into planning and disaster management could represent a paradigm shift for Liberia.

1.2.2. Potential for knowledge and learning

17. The project includes technical trainings and capacity building as cross-cutting activities in all project components. Recipients would be staff from the LMS, LHS, Environment Protection Agency (EPA), and the National Disaster Management Agency (NDMA). Activity 4.2.2 involves the facilitation of peer-to-peer learning. As per the independent TAP’s request, the AE submitted a detailed description of capacity building activities.

18. Component 5 would promote the participation of Liberia in the WMO Severe Weather Forecasting Demonstration Project, and in the Regional Climate Outlook Forum, which brings together experts from the regional and national climate centres, disaster risk management agencies, and representatives of farmers’ associations, universities, research institutions and regional and international organizations engaged in climate prediction and its applications, to produce consensus-based, user-relevant climate outlook products. Selected staff would be benefited with collaboration and study tours to world-class hydro-meteorological facilities, including the African Ministerial Conference on Meteorology (AMCOMET) Bureau, the African Centre of Meteorological Applications for Development (ACMAD), International Centre for Theoretical Physics, and UK Met Office, amongst others.

19. Provisions for the development of a Monitoring, Evaluation and Learning System are adequately described in the proposal.

³ Funding proposal, page 9.

1.2.3. Contribution to the creation of an enabling environment

20. The FP states that the participating agencies (EPA, LMS, LHS, and NDMA) would fully integrate project activities, by incorporating the expenses related to the operation and maintenance costs for the meteorological and hydrological monitoring and data management equipment into their annual budgets. However, the estimation of post-project O&M expenses were not found in the proposal. Questioned about this matter, the AE responded that O&M for the weather radar would be covered by the Liberian Aviation Authority (LAA) and the Robert International Airport Management (RIA), and that these institutions receive a share of the National Budget and also generate their own revenues. As requested by the independent TAP, the AE submitted the estimation of post-project O&M costs and a commitment letter from the Liberia Airport Authority for the post-project operation costs of all equipment procured by the project.

21. To promote sustained post-project O&M of the procured equipment, the project would provide staff technical training including: 6 staff on weather observation, 3 staff on weather forecasting, 2 staff on numerical weather prediction, 2 staff on climate modelling, prediction and scenarios generation, 2 staff on TV weather presentation at the intermediate level, 2 staff on data processing and management, 1 staff on IT and ICT (advanced level), and 6 staff from LMS and LHS on instrument maintenance and calibration.

22. Strengthened institutional capacity and inter-agency collaboration would also improve the project's long-term sustainability.

23. On the other hand, the funding proposal says that in the absence of the present GCF funded project "*...ongoing donor interventions are unlikely to be sustainable...*" due to the country's indebtedness, in addition to the declining government's budgetary allocation for hydrological and meteorological services.⁴ This issue raises the question of whether the government would or not be financially able to continue O&M of project interventions.

24. It is expected that strengthened climate services would generate revenues from selling climate information products to end-users, including commercial farmers, fishing companies, aviation sector businesses, and neighboring countries such as Sierra Leone, Guinea, and Ivory Coast.⁵ Ideally, the project should include specific activities aimed at assessing and developing the national and regional markets for climate products, including provisions to identify policy incentives that would help to unlock barriers to private sector investment in the climate services sector.

1.2.4. Contribution to the regulatory framework and policies

25. Component 4 includes providing support for the formulation of legislation to transform the LMS and LHS into a single semi-autonomous government agency called the Liberia Meteorological and Hydrological Service (LMHS).

26. To strengthen Liberia's disaster management framework, the project would develop guidelines, provide technical support and organize a national workshop.

1.2.5. Scalability and replicability

27. Given its support for institutional strengthening and technical training at a national level, the project has a significant scalability potential. The improved hydro-met services would allow for further upscaling throughout Liberia without equally increasing costs.

⁴ Funding proposal, page 53.

⁵ Funding proposal, page 26.

1.3 Sustainable development potential

Scale: N/A

1.3.1. Environmental co-benefits

28. The project has no direct environmental co-benefits. However, it has the potential to indirectly promote more efficient agricultural activities, which would in turn help to relieve pressure from the remaining natural ecosystems.

1.3.2. Economic and Social co-benefits

29. A more accurate and efficient forecasting and early warning communication system would allow to reduce damages and losses of lives and assets due to extreme weather events.

30. Enhanced weather and hydrological information services would allow for better flood risk management and risk-informed planning of agriculture and fisheries, thus reducing flood damages and improving the economic efficiency of these sectors.

31. The availability of quality hydro-meteorological information is fundamental for the generation of climate change adaptation knowledge and its mainstreaming into planning to enable a sustainable development pathway.

1.3.3. Gender-sensitive development impact

32. The Gender Assessment and Action Plan describes the gender-sensitive indicators and targets envisaged by the project to ensure gender equality.

33. The project includes conducting an in-depth gender analysis to assess gender disparities pertinent to the implementation of the programme, systemic barriers to gender equality in the agriculture sector, and specific components or other mechanisms to ensure equal gender participation.

1.4 Needs of the recipient

Scale: N/A

1.4.1. Vulnerability of the country and climate rationale

34. Almost half of Liberia's GDP originates from agriculture, forestry, and fishery.

35. Liberia is extremely vulnerable to climate change risks and climate-related hazards because of its low level of adaptive capacity.

36. The country suffered 14 years of civil war that led to the destruction of virtually all the hydro-meteorological observation network. A total of 34 manual water-level stations and 64 rainfall stations were operative before the civil war. Today, after the implementation of several donor-funded projects, there are 15 water-level stations and 14 rainfall stations in operation.

37. Other donor funded projects related to training and provision of hydro-met equipment have recently been implemented. The proposal lacks a detailed description of the current state of the LHS and LMS.

38. The proposal argues that Liberia is currently experiencing climate-induced increase in extreme weather events, changes in rainfall patterns and higher temperatures, which lead to floods, droughts, disruption to the agricultural system and reduction in the amount of productive land, pest infestation of crops, and lack of access to clean water and forest products.

39. The analysis of historical climate data presented in the feasibility study is limited to the annual average temperatures and total annual rainfall for the period 1976-2005. The analysis does not show the time series for these parameters but only the average values for the

mentioned period. Questioned by the independent TAP about the project's climate rationale, the AE submitted an improved temperature and precipitation analysis.⁶ The new version presents time-series of the anomalies of the annual average of daily mean surface temperature and of total annual precipitation. As clarified in the document, as a result of the civil war, there are no quality long-term and consistent climate records in Liberia. For this reason, the analysis of historical climate data is based on gridded historical time-series generated by the Climate Research Unit of the University of East Anglia (CRU).

40. CRU datasets are computer generated (i.e., reanalysis data), and gridded (i.e., non-point source values averaged over a large area, typically smallest grid size being 0.5 X 0.5 degrees). Data is only captured at the best at monthly average level, which misses micro-structure of climatic signals.

41. Since common meteorological hazards/phenomena such as droughts and floods are highly sensitive to daily rainfall, and point source specific data are critically important to understand any climatic trend that might trigger such an event, reanalysis data simply does not satisfy the requirement of data for trend analysis of indicators that are crucial to understand such phenomena.

42. Current effects of climate change in the project area should be demonstrated using real meteorological observational data for, at least, the last 20 years. However, the independent TAP understands that without adequate equipment (due to civil war, as indicated by the AE) such records cannot be gathered.

43. Climate projections presented by the AE are based in the results of the following regional climate models (RCMs): the Swedish Meteorological and Hydrological Institute, Rossby Centre (SMHI-RCA v4); the Climate Limited-area Modelling Community (CCLM v4.8.17); and the Helmholtz-Zentrum Geesthacht, Climate Service Center, Max Planck Institute for Meteorology (REMO2009). However, RCMs are not validated against historical data, and for this reason their level of precision cannot be established.

1.4.2. Vulnerable groups and gender aspects

44. 80% of Liberia's rural population is either moderately vulnerable or highly vulnerable to food insecurity. The most food insecure groups are those involved in palm oil production and selling, followed by hunters and contract labourers.

1.4.3. Economic and social development

45. The country is among the Heavily Indebted Poor Countries (HIPCs). The national poverty line was 54% in 2017, and 20% of the population is subjected to multidimensional poverty. The per capita income was as low as USD 650 in 2019.⁷

46. The country is ranked 176th in UNDP's human development index.

47. Only 9% of the total country population has access to grid electricity: 17% for urban population and less than 2% for rural population (World Bank, 2014).

1.4.4. Absence of alternative sources of financing

48. Liberia's national debt increased from 34% of GDP in 2017 to 40% of GDP in 2018.

49. The lack of financial resources to deal with climate change adaptation is evident.

1.4.5. Need for strengthening institutions and implementation capacity

⁶ Analysis of trends in temperature and precipitation in Liberia. September 10th, 2020.

⁷ Feasibility study, page 17.

50. Institutional strengthening is much needed and represents one of the main project objectives. As mentioned before, the project aims at strengthening institutions through capacity building and technical training to staff, and through support for inter-agency collaboration.

1.5 Country ownership

Scale: N/A

1.5.1. Alignment with national climate strategy and policies

51. The proposed project would support the Government of Liberia in reducing the vulnerability of its population to weather and climate risk and in ensuring the sustainable development of the country. The project is consistent with the priorities of Liberia Country Strategic Plan (2019-2023), the goals of Liberia's National Vision 2030, and Liberia's National Development Plan.

1.5.2. Capacity of accredited entities or executing entities to deliver

52. The Accredited Entity (AE) would be the AfDB, which has already successfully managed several projects in Liberia. The AfDB is currently handling 16 on-going and recently approved projects in Liberia, for a total investment of USD 390 million. AfDB's portfolio includes investments in the transport, energy, agriculture and rural development. Over the last three years, the AfDB has implemented hydro-met and climate risks interventions worth over USD 100 million.

53. The Environmental Protection Agency of Liberia, which would be the Executing Entity (EE), was established in 2003 and has the mission of creating effective environmental communication, education and public awareness, developing laws, regulations, policies and standards, effectively monitoring compliance to environmental laws and policies, providing high quality information and advising on the state of the environment and related matters, and ensuring effective environmental planning and reporting. EPA's experience in donor-funded projects include the GEF USD 3 Million funding within the Energy Access Project through the AfDB, and The European Union EUR 6 million grant to address climate change in Liberia under the auspices of the European Union Global Climate Change Alliance. The EPA is the national designated authority for the GCF. The EPA is also committed to the development of Liberia's National Adaptation Plan (NAP), with GCF funding of USD 3 million.

1.5.3. Engagement with civil society organizations and other relevant stakeholders

54. The stakeholders with interests, expectations and potential contributions to the project are identified and briefly described in the User and Stakeholder Analysis document. The proposed project has been co-designed in close collaboration and involvement of key actors. The National Climate Change Secretariat and Environmental Protection Agency played an active role in leading stakeholder engagements and building consensus. However, the proposal is missing a report describing the stakeholder consultations. Questioned by the independent TAP on this matter, the AE explained that "There were Nine (9) different consultative meetings held on the Project entitled Enhancing Climate Information Service for Resilient Development. Total stakeholders reached were 358 persons; comprises of 98 females and 260 males." And submitted four additional annexes (R3, R4, R5, R6, R7, R8 and R9) describing consultation activities held during project inception.

55. The design of the communication mechanism of the EWS would include consultations with communities on tailored early warning information through Community-based Action teams.

1.6 Efficiency and effectiveness

Scale: N/A

1.6.1. Cost-effectiveness and efficiency

56. The financial structure is adequate to achieve the project's objectives.

57. Being of a public service nature, with a still underdeveloped market, there is no reason to think project activities would crowd out private investment.

1.6.2. Amount of co-financing

58. The co-financing ratio is rather low: 0.125. The GCF would provide 87% of total financing.

1.6.3. Financial viability

59. Given that there is a uncertainty related to the potential economic benefits of project interventions, the economic analysis was conducted using System Dynamics. The model developed for the economic feasibility assessment is labelled the Liberia Climate Risk Assessment Simulation Model (LICRASIM).

60. Seven different scenarios were assessed to determine the potential impact of climate change in Liberia: (1) Baseline; (2) 25% increase in the fraction of GDP that is lost annually as a result of climate change from 2021-2025; (3) 25% decrease from 2012-2025; (4) 50% increase from 2012-2030; (5) 50% decrease from 2012-2030; (6) 75% increase from 2012-2035; and, (7) 75% decrease from 2012-2035.

61. The analysis of financial indicators demonstrates a region within which the financial viability of the project becomes apparent: at discount rate of 5%, the project becomes financially viable after 15 years.

Table 1
Analysis of financial indicators

Period	Project cost	PV - 3,5%	NPV - 3,5%	PV - 5%	NPV - 5%	PV - 10%	NPV - 10%	PV - 15%	NPV - 15%
2025 (5 years)	\$11 431 969	\$1 213 496	-\$10 218 473	\$1 744 000	-\$9 687 969	\$3 488 000	-\$7 943 969	\$5 232 000	-\$6 199 969
2030 (10 years)	\$11 431 969	\$2 839 701	-\$8 592 268	\$4 067 150	-\$7 364 819	\$8 134 300	-\$3 297 669	\$12 201 450	\$769 481
2035 (15 years)	\$11 431 969	\$4 971 586	-\$6 460 383	\$7 112 700	-\$4 319 269	\$14 225 400	\$2 793 431	\$21 338 100	\$9 906 131
2040 (20 years)	\$11 431 969	\$7 728 361	-\$3 703 608	\$11 050 950	-\$381 019	\$22 101 900	\$10 669 931	\$33 152 850	\$21 720 881

62. The table above shows that project costs are the same for 5 years and for 20 years of project activities, which demonstrates that project costs were not taken into account post-project O&M costs for the procured equipment. Questioned by the independent TAP about this matter, the AE submitted a new financial analysis taking into account post-project O&M costs. Financial indicators are presented in the following table:

Table 2
New financial analysis

Period	Project cost	PV - 3,5%	NPV - 3,5%	PV - 5%	NPV - 5%	PV - 10%	NPV - 10%	PV - 15%	NPV - 15%
2025 (5 years)	\$20 273 975	\$1 213 496	-\$19 060 479	\$1 744 000	-\$18 529 975	\$3 488 000	-\$16 785 975	\$5 232 000	-\$15 041 975
2030 (10 years)	\$20 273 975	\$2 839 701	-\$17 434 274	\$4 067 150	-\$16 206 825	\$8 134 300	-\$12 139 675	\$12 201 450	-\$8 072 525
2035 (15 years)	\$20 273 975	\$4 971 586	-\$15 302 389	\$7 112 700	-\$13 161 275	\$14 225 400	-\$6 048 575	\$21 338 100	\$1 064 125
2040 (20 years)	\$20 273 975	\$7 728 361	-\$12 545 614	\$11 050 950	-\$9 223 025	\$22 101 900	\$1 827 925	\$33 152 850	\$12 878 875

1.6.4. Best practices

63. The monitoring, evaluation and learning system (activity 5.3.1) would include specialized training to guarantee that high standards are maintained and activities are consistent with best practices in the field.

II. Overall remarks from the independent Technical Advisory Panel

64. The analysis of climate data presented is limited and the funding proposal does not have a solid climate change rationale. As a result of the civil war, there are no long-term climate records in Liberia to support a complete climate rational development. For this reason, the proposal presents an analysis of climate data based on gridded historical time-series generated by the Climate Research Unit of the University of East Anglia (CRU).

65. Acknowledging that that the global climate is changing, regardless the specific effects it would have in Liberia, the first logical step would be to invest in improving the climate knowledge base and strengthen related institution, so that future adaptation efforts are made wisely and based on quality data.

66. Therefore, given that the proposed project is mostly focused on improving the availability, quality and use of climate information, the independent TAP considers that an exception should be made for Liberia, a least developed country, allowing the use of climate data generated by CRU to demonstrate the current effects of climate change.

67. Based on these assumptions, the independent TAP recommends this funding proposal for approval with the following conditions:

(a) Before the first disbursement:

- (i) The AE shall provide to the Fund an assessment in a form and substance acceptable to the GCF Secretariat demonstrating the need to finance and implement Internet of Things (IoT) under this project. As it stands in the current proposal, the independent TAP considers IoT is beyond the reach of this project and may prove to be a burden, rather than a solution.
- (ii) The AE shall provide to the Fund, in form and substance acceptable to the GCF Secretariat, a clear and detailed assessment describing the complementarity between the project set out in the Funding Proposal and other projects (recently finished, on-going, or under preparation) involving the Liberia Meteorological Service (LMS) and the Liberia Hydrological Service (LHS), in respect of capacity



building activities and procured equipment and goods, to guarantee the project set out in the Funding Proposal would not be duplicating efforts and resources.

Response from the accredited entity to the independent Technical Advisory Panel's assessment (SAP018)

Proposal name:	Enhancing Climate Information Systems for Resilient Development in Liberia (Liberia CIS)
Accredited entity:	African Development Bank (AfDB)
Country/(ies):	Liberia
Project/programme size:	Small (SAP)

Impact potential
Thank you for the positive review. No further comments
Paradigm shift potential
Thank you for the positive review. No further comments
Sustainable development potential
Thank you for the positive review. No further comments
Needs of the recipient
Thank you for the positive review. No further comments
Country ownership
Thank you for the positive review. No further comments
Efficiency and effectiveness
Thank you for the positive review. No further comments
Overall remarks from the independent Technical Advisory Panel:
Thank you for your recommendation. We will handle that as part of the post approval processes before first disbursement.

Gender documentation for SAP018

Gender Assessment

**SAP: Enhancing Climate Information Systems (CIS) for Resilient
Development in Liberia**

Liberia

July 2020

PART I: GENDER ANALYSIS/ASSESSMENT

Background and Context

Liberia made conspicuous strides from the plague of civil war in the last decade of the twentieth century. There has been significant improvement in its socio-economic indicators and positive advancement in its demographic composition. The population growth in Liberia is similar to that of the average growth rate of the sub-Saharan Africa region. At the start of the twenty-first century, the country's population growth rate was 3.64% in 2001. This declined marginally to 3.60% at the end of the first decade in 2010, and further recorded a steep decline to 2.45% in 2018. The total population during this period increased from approximately 3 million in 2001 to 3.9 million and 4.8 million in 2010 and 2018, respectively. The crude death rate declined from about 14 per thousand people in 2001 to 9 and 8 in 2010 and 2018, respectively. This reflects a significant improvement in overall health and wellbeing.

The gender composition of Liberia's population is balanced, with the number of males slightly higher than the total number of females (see Figure A4.1). The gender dynamics are consistent among all age groups: children (0-14 years), adults (15-64 years), and elderly (above 64 years). The similarity in gender composition emphasizes the need for gender-sensitive policies to dealing with diverse socio-economic issues.

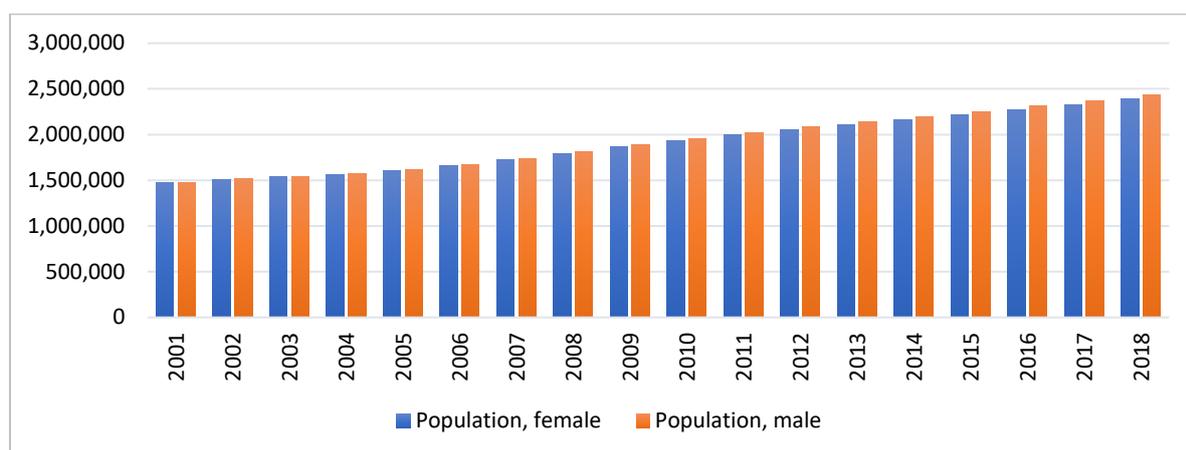


Figure A4.1: Gender composition of Liberia's population for the period 2001-2018

The economy of Liberia, until 2010, has mainly been agriculture-based, accounting for over half the total GDP. Currently, the agriculture sector still contributes over one-third of the country's GDP. It also employs the most people, ahead of industry, and services sectors. Most

of the agriculture sector is rain-fed; hence, it is exposed to the hazards of climate change, such as droughts and floods. The sector is most exposed and sensitive to climate hazards. There is, therefore, a compelling case to establish climate information and early warning systems to boost preparedness for climate disasters, avert foreseeable climate risks, and promote quality economic and human development in the country.

Liberia remains one of the Least Developed Countries highly vulnerable to the impact of climate change. The impacts of climate change and associated drivers impinge upon different lives and livelihoods among Liberians, including agrarian, fishery, and coastal communities in complex ways. Subsistence agriculture and artisanal fishing among rural and coastal communities are not just a livelihood but also a cultural pride that defines gender norms and division of labour at the household level. Climate change impacts have the potential to change gender and social relations at the local level, either positively or negatively.

Several studies reveal that climate change impacts are unevenly distributed across gender and that women and children are the ones most affected. The UNDP, in its Human Development Reports of 2005 and 2007, succinctly states that climate change threatens to increase existing inequalities with gender being one of the most pervasive threatening factors. Over a billion people were living below the poverty threshold globally at the beginning of the twenty-first century, 70% of whom were women (Denton, 2001). As of 2018, half of the people living below the poverty threshold are still women (Boudet, 2018); hence the consequences of climate change should not lead the already marginalized section of communities into further deprivation.

Gender issues are critical to Liberia's development and sustainability, especially since gender roles are observed within the country. Socio-cultural and economic underpinnings influence the gender assigned roles in the country. Women are automatically allocated critical tasks such as household food security, fetching wood and water, transportation and marketing activities, and shouldering greater responsibility for the care of the family. Extreme climate events, therefore, profoundly impact livelihoods and puts women in a highly vulnerable state. The preceding sections discuss key gender disparities issues concerning major socio-economic indicators.

Gender Inequality

There are traditional and cultural biases predicated on gender, which has created a more favourable platform for men than women and resulted in disparities between genders in terms of socio-economic opportunities. As of 2014, Liberia ranked 146 out of 155 countries on gender inequality with an index of 0.651, which suggests a severe gap and disparity between men and women. Gender disparities in the country occur in nearly all sectors in Liberia, situating women at the lower rung of the vulnerability ladder. The country also recorded low on gender empowerment, which measures women's participation in political decision making, participation in economic affairs and decisions, and wield power over economic resources. There is a critical challenge of livelihood vulnerability to climate change across Liberia due to its dependence on climate-sensitive sectors such as agriculture and forestry; artisanal fishing accentuates this vulnerability. These sectors are where most females in the country earn a living, either through formal or self-employment. It is essential, therefore, to tackle the issues that perpetuate this gender gap.

Legal and Institutional Framework on Gender

Liberia has several legal and policy initiatives regarding gender equality and the elimination of discriminatory practices against women. These initiatives range from international to national. At the international level, Liberia has demonstrated commitment to gender equality through the ratification of several international and regional treaties, declarations, and agreements on gender equality and the empowerment of women. They include the Convention on the Elimination of All forms of discrimination Against Women (CEDAW), the African Charter on Human and Peoples Rights of Women in Africa (Maputo Protocol), Convention on the Rights of Child, Convention of the Rights of Persons with Disabilities, International Covenant on Civil and Political Rights (1966); International Covenant on Economic Social and Cultural Rights (1966); UN Security Council Resolution 1325; UN Security Council Resolution 1820; UN Security Council Resolution 1612 (Children and Armed Conflict); Beijing Declaration and Platform for Action (1995); International Conference on Population and Development (1994); United Nations Declaration on Violence Against Women (1993), the Solemn Declaration on Gender Equality in Africa (2004) among others.

The Domestic Relations Law; Inheritance Act of 1998; National Gender Based Violence Plan of Action (2006); Policy of Girl Child Education (2006); The Gender and Development Act of

2001 which establishes and defines the institutional mandate of the Ministry of Gender and Development and revised into the Ministry of Gender, Children and Social Protection (MGCSP); National Gender Policy and Action Plan among others, are some of the notable initiatives at the National level. In the context of climate change and disaster risk management and preparedness, the government developed the National Drought Plan as a comprehensive plan where systems are in place to regularly assess and monitor the adverse impacts of drought and the effects of actions being employed to mitigate it. This Plan emphasizes gender equality in its implementation and will adopt best practices from elsewhere in the region to ensure the full inclusion and participation of men and women. It also seeks to reduce the gender gap existing between women and men by detailing actions to empower women and meet the different priorities of men and women in responding to drought and other phenomena. The National Drought Plan considers the following priority intervention areas with an emphasis on the issue of gender integration:

Early Warning: This aims to focus on strengthening specific national institutions to enable them to generate, record, store and share weather-related information and data that will improve the planning of various interventions in a timely and effective manner. This will allow for appropriate actions to be taken to avoid or reduce their risk and prepare for effective response.

Preparedness and Mitigation: Through a National Drought Task Force, comprising a wide range of stakeholders, the Plan will coordinate and supervise the implementation of the drought plan at all levels of government and shall be tasked with the activation of the various elements of the plan during times of need.

Response: Development of a Drought Contingency Plan as a short-term response before drought sets in, and such plan shall take into consideration areas that are inaccessible.

Communication: Communicating more effectively with members of the public and engaging the public around drought risk is important. Key elements to consider include: (a) how drought relieve is expected to be affected; (b) what cooperation and adjustments in living patterns may be expected from communities; (c) enhance people understanding on how to respond to drought once it occurs; (d) what the cost will be and; (e) what funding modalities are available and accessible.

The Environmental Protection Agency led the development of the Climate Change Gender Action Plan for Liberia in 2011 with support from the International Union for the Conservation of Nature (IUCN) in response to the gender disparity as it pertains to climate-related issues. The plan seeks to ensure that gender equality is mainstreamed into Liberia's climate change policies, programs, and interventions so that both men and women have equal opportunities to implement and benefit from mitigation and adaptation initiatives in combating climate change.

Political Framework on Gender

The fourteen-year civil war from 1989 to 2003 created a plethora of political and security issues that affected women and girls. An estimated 75 percent of women and girls suffered sexual and gender-based violence (SGBV) during this period. Women formed movements to match against these atrocities, leading to the Golden Tulip Declaration. The Golden Tulip Declaration, which was signed in August 2003 right after the Comprehensive Peace Agreement (CPA) and referenced the Security Council Resolution (SCR) 1325, articulates the demands women made towards restoring peace after the war. Since then, women's representation in decision-making improved significantly, evident by the election of President Ellen Johnson Sirleaf in 2006.

Women have also served in higher political offices such as the Ministry of Gender and Development, Ministry of Justice, Ministry of Youth and Sport, Inspector General of the National Police, Commissioners of the Truth and Reconciliation Commission, among others. The establishment of quotas, 20 percent women membership for the Armed Forces of Liberia and Liberian National Police, and 30 percent representation in parliament are some proactive gender-sensitive policy measures to increase the participation of women. Women's active involvement in the community and political policymaking fronts helped accelerate legislative reforms, social outreach, and economic reconstruction in Liberia. The percentage of parliamentary seats occupied by women increased from 7.8% in 2001 to 12.3% in 2018, which is still below the target number.

Gender Disparities and Socio-Economic Indicators

There are visible differences between men and women in terms of key socio-economic variables such as education, health, and employment. This assessment provides some of the key differences, which may exacerbate gender inequality as a result of climate change. A clear

understanding of these differences is useful for designing gender-sensitive approaches to mitigate such disparity and empower vulnerable groups.

Education

The literacy rate in Liberia is still low despite an increment from 42.9 percent in 2007 to 48.3 percent in 2017. In 2018, the education sector accounted for 6.9% of total government expenditure, equivalent to 2.3% of GDP. The sector remains challenged in terms of infrastructure. This could partly explain the high school dropout rate in the country (see Figure A4.2). Also, there is a wide disparity in the literacy rate between men and women. In 2007, the literacy rate of adult females was 27.0%, while adult males stood at 60.8%.

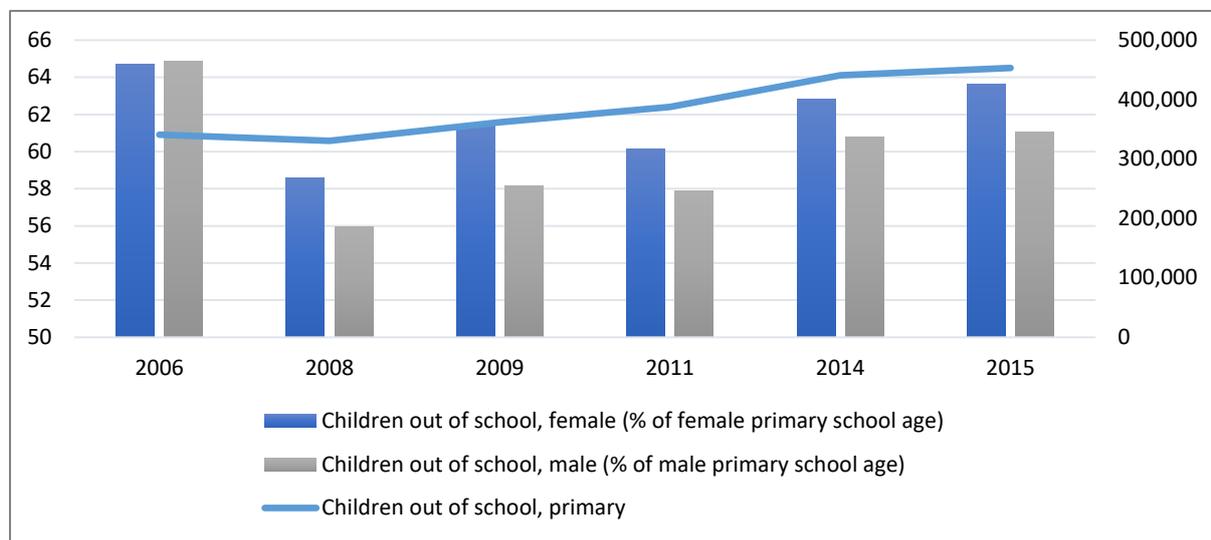


Figure A4.2: Statistics of children out of school in Liberia

The school enrolment rates were proportional at the start of the millennium. Female enrolment was slightly higher than males; however, the wave of activism that prompted an increase in school enrolment dissipated over the years and resulted in a decline in general enrolment, particularly girls' enrolment from 39.6 percent to 36.4 percent between 2011 and 2018.

As of 2018, more than four hundred thousand children of school-going age are not in school. This is a significant increase of about one hundred thousand the past decade, averaging ten thousand children dropping out of school annually. There are also apparent gender differences in school dropout rates. Most of the school dropouts are girls, consisting of approximately 63.7%, while boys' dropout rate stands at 61.0% in 2018. This is a significant increase from

58.6% and 56.0 % in 2008. The early dropouts make it harder to increase literacy rates and result in the large unskilled labour force.

Health

Health is one key area where gender disparities often exist due to the very anatomy of men and women. Women and girls are exposed to specifically gender-related health challenges, such as unsafe pregnancies. Overall, Liberia recorded an improved life expectancy over the past two decades. Life expectancy increased by approximately ten years for both men and women from 2001 to 2018. This resulted in an average life expectancy of 64 years for women and 62 years for men. The adolescent fertility rate of women between fifteen and nineteen years has steadily declined from 148 births per thousand people in 2001 to 137 and 127 births in 2010 and 2018, respectively. The fertility rate: the average births per woman, has decreased from 5.8 in 2001 to 4.5 in 2018 (see Figure A4.3).

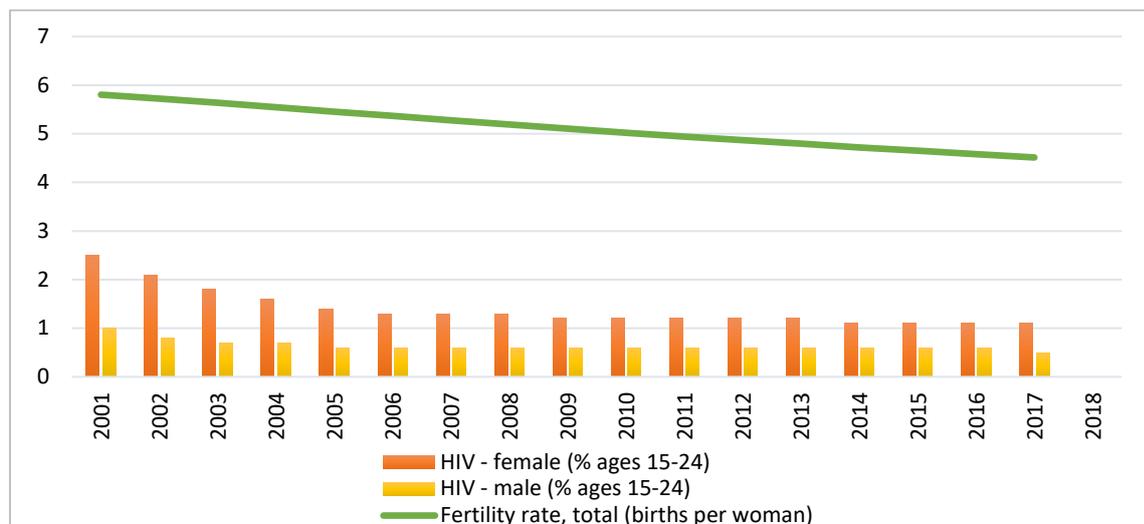


Figure A4.3: Statistics of HIV prevalence among teenagers in Liberia

The prevalence of HIV remains a concern in the country. The disparity between males and females is also apparent. In 2001, 2.5% of adolescent females between the age of fifteen to twenty-four were HIV positive, while only 1% of males had the virus. The numbers have, however, declined by more than half over the period, with only 1.1% of females and 0.5% of males being HIV positive as of 2018.

The substantial differences in HIV prevalence between males and females can be attributed, in part, to the differences in the number of people who use contraceptives such as condoms.

Approximately 18% of adolescents between fifteen to twenty-four years old used condoms in 2007, and only 9% of females in the same age cohort used condoms. The usage among males in this same age group more than doubled to 39% while females increased to only 15%.

Another notable health phenomenon the country experienced is the Ebola Virus Disease, which became an epidemic in 2014. It resulted in the deaths of hundreds of people, mainly women and girls. This is partly because of the low economic status of females, which hinder their ability to access health services. Another reason is the cultural underpinnings where women and girls bear the role of caregivers. They attend to the sick as part of the reproductive functions of women and girls, and they take care of the sick, thus exposing them to contracting the disease.

Employment

There are gender dimensions concerning agriculture and food security because women and girls are key contributors in the value chain process, from production to marketing of produce (UNDP, 2012). In many developing countries, up to 50 percent of the labour force is made up of women (FAO, 2011), and the majority of women that are economically active in these countries are engaged in agriculture as their leading economic enterprise (Doss, 2011). Liberia mirrors these characteristics; nearly half of the country's labour force consists of females, and the number of women employed in the agriculture sector also exceeds that of men (see Figure A4.4).

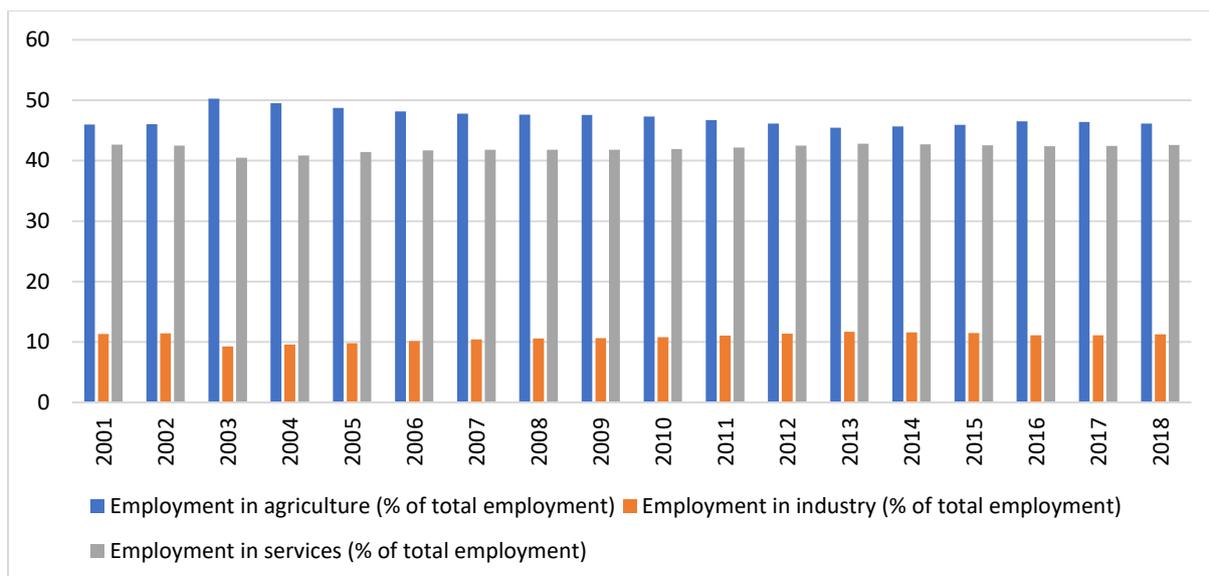


Figure A4.4: Percentage of employment in different sectors

Apart from the agriculture sector, where the ratio of men to women is equal, men dominate the industry and services sectors. Also, across the sectors, females are remunerated less than their male counterparts. The number of female civil servants in senior management has not recorded significant increments in the past two decades.

There are many people whose employment is classified as vulnerable. There are more women in such vulnerable employment than there are men. The number of females in vulnerable employment declined from 89.7 percent in 2012 to 88.2 percent in 2018. This is an insignificant reduction for such a high number of vulnerabilities, especially compared to vulnerable male employment, which decreased from 70.7 percent to 67.7 percent.

There are also more male salaried workers than females. Between 2001 to 2018, the number of females who were salaried workers only increased from 8.6% to 9.8%. During the same period, the number of male salaried workers increased from 27% to 30%, over three times that of females. This is a highlight of the employment inequality that exists in the formal sector. Most women, as a result, become industrious and create employment for themselves, leading to more self-employed women than men. Currently, approximately 90 percent of females are self-employed, compared to 70 percent of males.

Energy, Water, and Transport

Infrastructure is another area where women and men have disproportionate access, either as a result of underlying socio-cultural norms or economic dynamics. Some critical infrastructures include energy, water, and transport. The low access to quality drinking water and sanitation facilities can result in a disease outbreak. Natural disasters such as flooding, which is common in Liberia, can leave in its wake a water-borne disease epidemic. Another disaster, such as drought, can create adverse outcomes that affect genders differently. Since the responsibility of providing household services such as water and energy is laid upon women, they suffer the most in the wake of disasters that cause stress in the access to these services. During droughts, women and girls walk a longer distance to fetch water for household use. They also spend long hours gathering firewood for different energy services. This, coupled with the transportation challenges such as traveling to the market to sell farm produce and buy foodstuff for household consumption, highlights the level of depth that women and children are at risk in the event of climate hazards. Poor roads limit the ability of farmers to move their farm produce to markets, thus limiting one of Liberia's major economic sectors and undermining returns for women in general since most of them are employed in the agriculture sector.

Women play a triple role in agricultural households: productive, reproductive, and social. The productive roles performed by both men and women focus on economic activities. Women, however, almost exclusively borne the reproductive role, including childbearing and rearing; household maintenance, including cooking, fetching water, and fuelwood; and the social role or community building, often dominated by women, which includes arranging funerals, weddings, and social events. Promoting gender-sensitive response to these issues require actions beyond traditional approaches to sustainable development.

Land Access

The women represent nearly 70 percent of the agricultural labour force, produce up to 70 percent of the food consumed in households in regions such as Maradi, and performing at least 50 percent of all agriculture tasks. Although women dominate the agriculture sector, they face growing challenges and climate-related risks (UN Women, 2018). The productivity of land managed by women is lower, which is due to several systemic constraints they face in pursuing their activities. Systematic gender inequalities in agricultural production continue to persist, mostly due to differences in (i) access to and use of agricultural inputs, including improved

technologies; (ii) land tenure security and related investments in the land; (iii) market and credit access; (iv) human and physical capital; and (v) informal institutional constraints affecting farm/plot management (UN Women, 2018).

In addition to varying climate change impacts depending on geographical factors, men and women in the same location are likely to have different coping strategies and adaptive capabilities to deal with these impacts. The different strategies and capabilities suggest incongruent levels of vulnerability to the effects of a changing climate. The incongruence implies that climate change is likely to affect men and women in entirely different ways in the future, a disparity which is now already evident in observations concerning the impacts of extreme climatic events such as floods and droughts (UNDP, 2012).

The disparities in some of the major socio-economic indicators are expected to widen in the coming years, partly due to the adverse effects of climate change. The importance of the proposed project which aims to respond timely and adequately to various climate hazards entrenched. The preceding gender and social inclusion action plan detail how some of the gender issues will be attenuated as a result of this project.

Situation Analysis

Strong traditional gender roles and gender disparities exist in different socio-economic sectors. In Liberia, both men and women are traditionally involved in the labour intensive agricultural practices without any forms of protection against diseases, extreme weather, and other climatic conditions.

Both men and women have crucial roles in responding effectively to climate risks, which, when well analysed, could play an essential role in building resilience as well as sustaining the livelihoods of the local community members. In most parts of Liberia, men use natural resources in agriculture, logging, and fishing for commercial purposes more than women do. In crop production, women often grow a wider diversity of crops. In most cases, men and women perform complementary roles—for example, men clear land, women plant, tend crops and men harvest and market crops. Women play a unique role in guaranteeing household food security and building resilience to shocks and stresses. While discussions at the intersection of gender equity/social inclusion and resilience often focus on the vulnerabilities of women, girls, and disadvantaged persons during disasters, these same individuals can also be powerful agents of resilience. Women farmers, however, tend to have less access than men to climate

information, a critical resource used to inform actions that can increase resilience to the negative impacts of climate change.

The gender assessment of this project is guided by the GCF and Government of Liberia gender policies and based on consultations with different stakeholders, including the Ministry of Gender, Children, and Social Protection. Consultations with women organizations and organizations representing women will remain an on-going process during project execution to ensure all gender concerns are incorporated in the design and framework of early warning systems.

The project will focus on gender-sensitive planning and implementation to ensure the highest gains in the fight for gender equality and equity. Upon commencement of the project, an in-depth gender analysis will be undertaken to collect additional information relevant for the implementation and, ultimately, the success of this project from gender equality and equity. The gender analysis will cover (i) gender disparities pertinent to the implementation of the programme; (ii) systemic barriers to gender equality in the agriculture sector and opportunities to address them within the capacity of the programme; (iii) the current level of knowledge about Climate-Smart Agriculture practices and knowledge gaps to be addressed through capacity building and awareness-raising activities; and (vi) specific components or other mechanisms to ensure that both women and men participate in and benefit from the programme.

PART II: GENDER AND SOCIAL INCLUSION ACTION PLAN

The purpose of the gender action plan is to provide a framework through which women and men are involved in shaping the design, format, language, and application of climate information and hydromet services to meet their respective needs. The action plan will ensure the outcome of the gender assessment is integrated into the project design for a gender responsive and socially inclusive project.

There is a recognition of the sparse data concerning the gender-differentiated climate change impacts and access to climate information in Liberia. Therefore, the project activities aim to substantiate community-based and gender perspectives throughout the climate information value chain, including production, support, and delivery of climate services.

Overall, the project design and execution will strongly feature women and the benefits accruable to them due to averted climate impact by increasing their resilience and capacity to adapt to climate threats in the future. The project will employ a gender lens to involve significant players in various government sectors and local communities to build capacity for interpreting climate data, communicating climate information, and formulating adaptation mechanisms to impending climate hazards that will chart a paradigm shift towards balanced and equal access of all genders to resources and opportunities.

This gender action plan is based on preliminary findings of a gender analysis; a comprehensive field study assessment will further elaborate gender-specific activities, baselines, targets and indicators developed to meet the needs of men and women, including the elderly, disabled, children, youth, and socio-economically disadvantaged.

Gender aspects of each project components are suggested below, and would be substantiated upon completion of the situation analysis in the first year of project implementation.

Component 1: Enhanced Disaster Risk Knowledge of individuals and institutions across the country. Activities will pay particular attention to bridging knowledge gaps on climate vulnerability of end-users, including women and men, disproportionately impacted by climate change impacts. Consultations will be held with relevant line ministries and vulnerable communities to build awareness on the range of cost-effective, tailored climate information interventions available. These consultations will form part of the guidelines for streamlining meteorological and hydrological information generation and the risk modelling tools to assess

the potential impact of climate-related hazards and accompanying losses - including lives, livelihoods, properties, and cost implications.

Component 2: Enhanced Detection, Monitoring, Analysis, and Forecasting of the Hazards and Possible Consequences. Component activities will contribute to enhancing the climate services information system, including creating a community of practice (CoP) in operational numerical weather and seasonal prediction, forecasts verification, development, use, and management of information and e-infrastructure. A gender-based approach will ensure co-development and production of forecasts for decision making reflect the needs of women and other vulnerable groups in the agriculture and other relevant sectors.

Component 3: Improved warning dissemination and communication. Stocktaking, training, gender-sensitive field surveys, and communication activities will underscore a rigorous process of consultation and participation of a wide range of stakeholders at the community level, including CBOs, women groups (for instance, in the agriculture and fisheries sectors). The gender situation analysis will elucidate the community and particularly women's needs, access, and use of climate/weather information, as well as determine the appropriate dissemination channels relative to respective sectors. The consultation process at the community level will underpin the existing community and gender-sensitive structures, including leveraging the expertise of social development and gender experts at district and local levels.

In the context of promoting effective communication channels and establishing a community EWS, gender-specific assessments of women's situation in sectors and communities will inform the language, format, design, and application of climate services and determine the most accessible form of communication for women and men.

Component 4: Improved Preparedness and Response Capabilities through legislation and forecast-based financing (FBF) mechanism. The objective of this component is to increase political support and recognition of the Liberian Hydromet Service through appropriate policies and legislation to support the transition of the hydromet services into an autonomous body with an improved finance base. This will enhance the preparedness and response to weather- and climate-related hazards using a proactive mechanism, FBF, that supports the pre-planning of early actions at community and government levels.

Activities on the development of Early Action Protocols roadmaps and scoping studies will integrate gender concerns. The capacity of climate service institutions, including the NDMA, to deliver the activities in a gender-sensitive manner will be accessed to and inform the dialogue. Gender expert(s) and social development officers from the Ministry of Gender, Children and Social Protection will be engaged in the formulation of early warning indicators and thresholds, and Standard Operating Procedures (SOPs). SOPs for disseminating weather and climate information and early warnings will include trainer manual(s) on the use of a range of national and local gender-sensitive media for disseminating weather and climate information, as well as early warnings, to end-users.

Component 5: Co-ordinated Project Management and Implementation across all climate information service units in Liberia. Gender assessment will illuminate the gender elements of existing climate information policy and decision-making frameworks. The project will ensure the adoption of an equitable, participatory approach to promote shared decision-making and policy development processes.

Activities	Indicators and targets	Timeline	Responsibilities	Indicative Cost
<p>Impact Statement: Improved resilience of vulnerable communities and individuals, including women, to climate risks and disasters by generating and disseminating accurate climate information to improve their climate adaptation.</p> <p>Outcome Statement: Increased access and application of climate information and economic returns for 50% of women engaged in various sectors of the economy where climate risks perpetuate gender disparity unfavourably towards women.</p> <p>Output(s) Statement:</p> <ul style="list-style-type: none"> (i) Increased awareness of and resilience to impending climate hazards and understanding of the impacts of recurrent climatic shocks through analysis and interpretation of climate data. (ii) Improved preparedness and readiness to climate risks through timely access to accurate information and warnings of potential disasters. (iii) Enhanced capacity of human resources at national, county, and local levels through gender mainstreaming, to promote gender-sensitive response to climate risks. 				
<p>Component 1: Enhanced Disaster Risk Knowledge of individuals and institutions across the country</p>				
<ul style="list-style-type: none"> - Prepare ToR and recruit a gender and social development long-term consultant - Gender Situation Analysis will provide a holistic perspective of gender issues and challenges in Liberia’s climate information and early warning systems. Activities will include consultations with diverse groups at the district, county and national levels, and gender surveys on climate information and DRR needs, etc. - Training and awareness raising workshops on climate resilience and disaster risk management in social and economic sectors - Promote the collection and use of gender-disaggregated data on DRR to inform the design of targeted interventions. 	<p>Baseline= 0 Target =</p> <ul style="list-style-type: none"> - Gender Action Plan revised and implemented. - Better understanding of gender-specific needs in the provision, access and use of weather and climate services for resilience, including through the collection of gender-disaggregated data. - At least 50% women and vulnerable groups trained and participate in project activities <p>Indicators:</p> <ul style="list-style-type: none"> - Gender responsive guidelines for streamlining meteorological and hydrological information generation and risk modelling tools - Percentage of population within target districts with access to improved climate-related flood, storm and coastal surge warnings (disaggregated by gender). - Percentage of women-led households participated in meetings & workshops - Percentage of women represented in community based action teams 	<p>Y1-Y2</p>	<p>PMU (Gender Consultant), EPA</p>	<p>US150,000</p>

	- Number of training workshops tailored to women, youth and vulnerable groups			
Component 2: Enhanced Detection, Monitoring, Analysis and Forecasting of the Hazards and Possible Consequences				
- Consultations and training on gathering, analysing and disseminating weather and climate information(. numerical weather and seasonal prediction, forecasts verification, development, use, and management of information and e-infrastructure) tailored to the different needs of user groups including women	Baseline= 0 Target = - Training designed to meet needs of women and other vulnerable groups. - At least 50% women trained and engaged in weather forecasting process. Indicators: - Percentage of women trained on weather and climate information - Percentage of women representative in community of practice (CoP)	Y1 – Y2	PMU (Gender Consultant), EPA	US\$50,000
Component 3: Improved warning dissemination and communication				
- Consultation with a wide range of stakeholders at the community level, including CBOs, women groups (for instance, in the agriculture and fisheries sectors).	Baseline= 0 Target =At least 50% of women participate in consultations and design of communication channels Indicators: - Number of communication channels operational to disseminate climate-related early warnings - Development of gender responsive communication channels	Y1-Y5	PMU (Gender Consultant), EPA NDMA, LMHS	US\$50,000
Component 4: Improved Preparedness and Response Capabilities through forecast-based financing (FBF) mechanism				
- Training of relevant institutions (NDMA, LHMS, EPA) on the delivery of gender responsive Early Action Protocols (EAP), Standard Operating Procedures (SOPs). and FBFs. - Production of training manual(s) on the use of a range of national and local gender-sensitive media for disseminating weather and climate	Baseline= 0 Target = - 2 Training manuals and guidelines developed on gender sensitive climate information disseminating systems	Y3-Y5	PMU (Gender Consultant), EPA	US\$50,000

information, as well as early warnings, to end-users.				
Component 5: Framework, Policy, and Decision-Making Mechanism Established				
<ul style="list-style-type: none"> - Gender assessment of existing climate information policies and decision making protocols - Ensure women, youth and other vulnerable groups are engaged in decision making 	<p>Baseline= 0 Target = Develop gender inclusive protocols and policy on climate change and information and systems.</p>	Y2-Y5	PMU (Gender Consultant), EPA	US\$50,000
Total				US\$ 350,000

