Meeting of the Board
27 February - 1 March 2018
Songdo, Incheon, Republic of Korea
Provisional agenda item 15

GCF/B.19/22/Add.10

6 February 2018

Consideration of funding proposals – Addendum X

Funding proposal package for FP068

Summary

This addendum contains the following three parts:

a) A funding proposal summary titled "Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia";
b) No-objection letter issued by the national designated authority(ies) or focal point(s); and
c) Environmental and social report(s) disclosure;

GREEN CLIMATE FUND

Funding Proposal

Version 1.1

The Green Climate Fund (GCF) is seeking high-quality funding proposals.

Accredited entities are expected to develop their funding proposals, in close consultation with the relevant national designated authority, with due consideration of the GCF's Investment Framework and Results Management Framework. The funding proposals should demonstrate how the proposed projects or programmes will perform against the investment criteria and achieve part or all of the strategic impact results.

Project/Programme Title: **Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia**

Country/Region: Georgia

Accredited Entity: United Nations Development Programme

Date of Submission: 5 February 2018

Contents

Note to accredited entities on the use of the funding proposal template
• Sections **A, B, D, E** and **H** of the funding proposal require detailed inputs from the accredited entity. For all other sections, including the Appraisal Summary in section F, accredited entities have discretion in how they wish to present the information. Accredited entities can either directly incorporate information into this proposal, or provide summary information in the proposal with cross-reference to other project documents such as project appraisal document. • The total number of pages for the funding proposal (excluding annexes) is expected not to exceed 50.

Please submit the completed form to:

fundingproposal@gcfund.org

Please use the following name convention for the file name:

"[FP]-[Agency Short Name]-[Date]-[Serial Number]"

A.1. Brief Project / Programme Information		
A.1.1. Project / programme title		**Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia**
A.1.2. Project or programme		Project
A.1.3. Country (ies) / region		**Georgia**
A.1.4. National designated authority (ies)		**Ms. Ekaterine Grigalava, Deputy Minister of Environment and Natural Resources Protection; E-mail: e.grigalava@moe.gov.ge**
A.1.5. Accredited entity		**United Nations Development Programme**
A.1.5.a. Access modality		☐ Direct ☒ International
A.1.6. Executing entity / beneficiary		Executing Entity: Ministry of Environment Protection and Agriculture of Georgia (MoEPA) Beneficiary: up to 1.7 Million people at risk of climate-induced extreme events and hazards
A.1.7. Project size category (Total investment, million USD)		☐ Micro (≤10) ☐ Small (10<x≤50) ☒ Medium (50<x≤250) ☐ Large (>250)
A.1.8. Mitigation / adaptation focus		☐ Mitigation ☒ Adaptation ☐ Cross-cutting
A.1.9. Date of submission		5 June 2017; 5 October 2017; 22 November 2017; 12 December 2017; 15 January 2018; 5 Feb 2018
A.1.10. Project contact details	Contact person, position	Natalia Olofinskaya, Regional Technical Specialist
	Organization	UNDP
	Email address	Nataly.olofinskaya@undp.org
	Telephone number	+90(543)532-3046
	Mailing address	UNDP Istanbul Regional Hub for Europe and CIS Key Plaza, Abide-i Hürriyet Cd., İstiklal Sk. No:11, room 1107 Şişli, 34381, Istanbul, Turkey

A.1.11. Results areas *(mark all that apply)*

Reduced emissions from:

- ☐ Energy access and power generation (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)
- ☐ Low emission transport (E.g. high-speed rail, rapid bus system, etc.)
- ☐ Buildings, cities and industries and appliances (E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.)
- ☐ Forestry and land use (E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.)

Increased resilience of:

- ☒ Most vulnerable people and communities
  (E.g. mitigation of operational risk associated with climate change – diversification of supply sources and supply chain management, relocation of manufacturing facilities and warehouses, etc.)
- ☐ Health and well-being, and food and water security
  (E.g. climate-resilient crops, efficient irrigation systems, etc.)
- ☒ Infrastructure and built environment
  (E.g. sea walls, resilient road networks, etc.)
- ☐ Ecosystem and ecosystem services
  (E.g. ecosystem conservation and management, ecotourism, etc.)

A.2. Project / Programme Executive Summary (max 300 words)

1. Due to the complex mountainous terrain and climate, Georgia is subject to both geological and hydro-meteorological hazards. According to Georgia's 2nd and 3rd National Communications and other studies[1], under climate change the frequency, intensity and geographical spread of extreme hydrometeorological hazards will increase. Georgia's INDC estimates economic losses from climate-induced hazards without adaptation measures for the period 2021-2030 to be $US 10-12 billion, while the cost of adaptation measures is estimated to be 1.5-2 billion USD[2].

2. To date, hydrometeorological hazard risk management has relied on the limited and expensive hard structural protection measures; emergency response with limited reliance on forecasts and early warning of the population; post event compensation and relocation of victims, resulting in eco-migrants; and post event recovery and risk reduction. In order to adapt to climate change, Georgia needs to adopt a proactive integrated climate risk management (CRM) approach centred around risk reduction, prevention, and preparedness through the establishment of a multi-hazard early warning system and an enhanced use of climate information in planning and decision-making across all sectors. This GCF project will address the main barriers to the establishment of a multi-hazard early warning system (MHEWS) and all other aspects of *a priori* climate risk management required to support an effective MHEWS.

3. The project will achieve transformative change in climate risk reduction and management in Georgia by development of a fully-integrated impact-based MHEWS system. In doing so it will introduce a standardised hazard, risk and vulnerability assessment and mapping methods and technologies and provide critical climate risk information to enable the implementation of nation-wide risk reduction policies. Importantly, it will develop long-term institutional and community capacities in climate risk reduction (CRR), climate change adaptation (CCA) and MHEWS. The project will thus catalyse a paradigm shift towards climate risk-informed and resilient development and will directly benefit up to 1.7 Million people (40% of the population) currently at risk from hydrometeorological hazards.

A.3. Project/Programme Milestone

Expected approval from accredited entity's Board (if applicable)	N/A
Expected financial close (if applicable)	TBD (date of agreement on the FAA between UNDP and GCF)
Estimated implementation start and end date	Start: 01/08/2018 End: 31/07/2025
Project/programme lifespan	7 years 0 months

[1] World Bank project: *Reducing the Vulnerability of Georgia's Agricultural Systems to Climate Change*; USAID/GLOWS project: *Integrated Natural Resources Management in Watersheds of Georgia; Regional Climate Change Impacts for the South Caucasus Region'* funded through ENVSEC (Environmental Security) initiative and commissioned by UNDP

[2] Georgia's Intended Nationally Determined Contribution submission to the UNFCCC

B.1. Description of Financial Elements of the Project / Programme

4. The Government of Georgia requests funds in the form of grant, given the public good nature of the proposed climate risk reduction investments targeting enhanced resilience of around 1.7 million people, including the most vulnerable and poor rural communities living in remote mountainous areas. It is unlikely that revenue streams will occur from these investments and hence loans or non-grant instruments will not be feasible. The project will develop climate risk information products which will mainly benefit the population at risk in line with the statutory obligations of the GoG to provide the necessary information to enable them to safeguard their lives, livelihoods and assets from climate induced extreme hydrometeorological risks. The majority of recipients of climate risk information (i.e. the public at large) is unable to pay for such services.This is the responsibility of government and therefore this activity does not lend itself to cost-recovery for these essential statutory services to be provided to the public.

5. The project is fully aligned with the national government plans for strengthening the hydro-meteorological monitoring network and will leverage new and additional co-financing from a wide range of national partners. The Government of Georgia identified several sources of co-financing and partner initiatives to align with GCF financing. Major co-financiers are:

i) The MoEPA and its subordinate agencies – National Environmental Agency (NEA) and Environmental Information and Education Center (EIEC) – $ US 12.78 Million co-financing to the Outputs 1 and 2 of the project[3]: this co-financing is new and additional and cover specifically: (i) O&M costs for new hydrometeorological observation equipment to be procured by the project incurred over the project lifetime; (ii) purchase of additional monitoring equipment for the enhanced and expanded hydrometeorolgical monitoring network, including three meteorological radars, a drone, hydrological station on Aragvi river; (iii) costs of new NHEWS data management, periodic update of hazard and risk maps, creation of warning and other data management activities for the adequate operation of the new MHEWS over the lifetime of the project; (iv) EIEC contribution to the CRM-related communication, capacity building, education and awareness activities to be carried out in the course of the project implementation complementary to Activity 3.2. of the GCF project; (v) in-kind contribution of $0.212 mln (0.7% of the total commitment) associated with the activities of the MoEPA and EIEC in support of the project management and and US$$0.278 mln for policy and regulatory work under activity 2.1. (staff time, travel, use of premises for the project implementation). In addition, the MoEPA is commited to allocate another $US 18.85 million for the post-project O&M of hydrometeorological equipment and post-project data management and system updates (this amount is not included in the GCF project co-financing). Details of the contribution are outlined in the letter of co-financing commitment from MoENRP enclosed in the Annex IV.

ii) MoEPA (for the former Ministry of Agriculture/MoA) - $US 0.6 Million co-financing to the Output 2 of the project: O&M of expanded agrometeorological network (15 new agrometeorological stations to be procured by the project) over the course of the GCF project (5 years period). In addition, there is a commitement to allocate another $US 1.8 million for the post-project O&M of agrometeorological stations (this amount is not included in the GCF project co-financing);

iii) The Ministry of Regional Development and Infrastructure (MRDI) – $US 7.27 Million co-financing to the Output 3 of the project: implementation of flood defence measures. These government funds are new and additional and will be released in the course of the project (2018-2023) for the implementation of the priority structural measures identified and designed by the GCF project. The MRDI committed to co-finance these specific measures identified through the project development phase for 13 high-risk sites. Details on the structural measures are provided in the Feasibility Study (Annex II).

iv) The Ministry of Internal Affairs (MIA) - $US 16.54 Million co-financing to Outcomes 1, 2 and 3: EMA costs of managing a centralized disaster risk meta-data base and MHEWS (US$63,272; Activity 1.4.); Joint Operations

[3] In January 2018, the Ministry of Environment and Natural Resources Protection and Ministry of Agriculture were merged into one Ministry now called the Ministry of Environment Protection and Agriculture (MoEPA). MoEPA will be the project Executing Entity/Implementing Partner. Consultations have been conducted with the new MoEPA Management. MoEPA takes over all the previous co-financing commitments of the MoENRP and MoA, thus the co-financing commitments communicated in the letters from MoENRP and MoA are valid and will be fully met by MoEPA.

Centre (JOC) surveillance network - procurement and maintenance (US$16.44 mln; Activity 2.2.); MIA annual capacity building/trainings for local self-governance authorities (US$34,005; Activity 3.2.);

v) Swiss Agency for Development Cooperation (SDC) - $US 5 Million co-financing to Outcomes 1 and 2: setting up institutional and legal frameworks for the hazard mapping system (as part of the MHEWS) – US$0.8 mln; hazard mapping for climate-induced hazards – US$ 3.2 mln; undertaking related capacity-building of the Georgian institutions, including technical advisory services and trainings – US$ 0.6 mln; guidance and advisory services for multi-hazard risk management planning, including municipal-level multi-hazard response and preparedness plans – US$ 0.4 mln. Within these ammounts indicated in the co-financing letter, the management costs are included in the amount of US$ 0.508 mln associated with the activities in support of the project management

vi) In addition to this, the Local Governments (LGs) of the municipalities where the structural measures will be implemented are committed to cover post-project 20-year O&M costs for the 13 flood defense structures for the total amount of $US 3.15 Million. Details on the O&M are provided in the O&M Plan (Annex XIII.b.); the activities to be covered will include periodic removal of sediments and control of vegetation in the riverbeds. These financial commitments were not included in the GCF project co-financing as they refer to the post-project period.

vii) Tbilisi Mayor's Office - $US 1.05 Million co-financing to the Output 2 of the project: the co-financing will be closely coordinated with the GCF activities under Output 2 on the regulatory frameworks, institutional strengthening and planning and will cover activities related to enhanced regulations, planning and management capacity for resilience in the framework of the 100 Resilient Cities project (US$1 Million). The co-financing also include in-kind contrinbution of $51,600 in support of the project management in the form of the office space, work shop and meeting venues for the GCF project events and specialists. In addition to this, the Tbilisi Mayor's Office is committed to invest another US$12.1 Million in the course of the GCF project into structural measures to enhance resilience to floods, mudflows and landslides as part of the implementation of the PDNA recommendations.

All co-financing letters are submitted in the Annex IV.

Table 1: Financial Elements per project outputs[4]

Output	Activity	GCF funding amount (million USD)	Co-financing amount (USD million)						Amount (for entire project) (USD million)	Amount (for entire project) (million GEL)*
			Tbilisi Mayor's Office	MoEPA (MoENRP)	MoEPA (MoA)	SDC	MIA	MRDI		
Output 1. Expanded hydro-meteorological observation network and modelling capacities secure reliable information on climate-induced	*Activity 1.1. Expanding hydro-meteorological observation network*	5.663		9.520					15.183	36.652
	Activity 1.2. Risk zoning based on hazard and risk maps for all major basins in Georgia for key climate-			1.008		3.050			4.058	9.796

[4] The fee arrangement for the proposed project to be aligned with the GCF Board's decision on fees. The Accredited Entity (AF) Fee for the proposed project is US$ 2,164,288. The budget figures presented in this proposal exclude the fee.

	hazards, vulnerability and risks	*induced hazards*									
		Activity 1.3: Introduction and implementation of methods and tools for the systematic gender-sensitive socio-economic vulnerability assessment	0.325							0.325	0.784
		Activity 1.4: A centralized multi-hazard disaster risk information and knowledge system	0.305					0.063		0.368	0.888
	Output 2: Multi-hazard early warning system and new climate information products supported with effective national regulations, coordination mechanism and institutional capacities.	*Activity 2.1: Institutional and legal frameworks and institutional capacity building for the MHEWS and for the enhanced use of climate information.*	0.107	0.200	0.278		1.043			1.628	3.931
		Activity 2.2: Development and implementation of the MHEWS covering all Georgia	2.621		1.050			16.440		20.111	48.549
		Activity 2.3: Enhancing access and the use of weather and climate information and agrometeorological information services by farmers and agricultural enterprises	1.075			0.600				1.675	4.043

	Activity 2.4: Climate-informed MHRM planning: development of basin-level multi-hazard risk management plans; municipal-level multi-hazard response and preparedness plans	2.261	0.800			0.400			3.461	8.354
Output 3: Improved community resilience through the implementation of the MHEWS and priority risk reduction measures	*Activity 3.1: Implementation of community-based early warning schemes and community-based climate risk management*	5.272							5.272	12.727
	Activity 3.2: Public awareness and capacity building programme to effectively deliver climate risk information and training to communities and local first-responders.	1.447		0.710			0.034		2.191	5.288
	Activity 3.3: Implementation of priority risk reduction interventions	5.862						7.272	13.134	31.705
Project Management Costs		2.117	0.051	0.212		0.508			2.888	6.971
Total Project Financing		**27.054**	**1.051**	**12.778**	**0.600**	**5.000**	**16.538**	**7.272**	**70.293**	**169.686**

*UN exchange rate as of 1 June 2017. 1 US dollar = 2.414 Georgian Lari.

Please see Annex V for the budget breakdown by expenditure type (project staff and consultants, travel, goods, services, etc.) and disbursement schedule.

B.2. Project Financing Information

	Financial Instrument	Amount	Currency	Tenor	Pricing

(a) Total project financing	**(a) = (b) + (c)**	70.293	million USD ($)		
(b) GCF financing to recipient	(i) Senior Loans (ii) Subordinated Loans (iii) Equity (iv) Guarantees (v) Reimbursable grants * (vi) Grants *	.... 27.054	Options Options Options Options Options million USD ($)	( ) years ( ) years	( ) % ( ) % ( ) % IRR
	** Please provide economic and financial justification in section F.1 for the concessionality that GCF is expected to provide, particularly in the case of grants. Please specify difference in tenor and price between GCF financing and that of accredited entities. Please note that the level of concessionality should correspond to the level of the project/programme's expected performance against the investment criteria indicated in section E.*				
	Total requested (i+ii+iii+iv+v+vi)	27.054	million USD ($)		

(c) Co-financing to recipient	**Financial Instrument**	**Amount**	**Currency**	**Name of Institution**	**Tenor**	**Pricing**	**Seniority**
	Grant	12.368	million USD ($)	MoEPA	( ) years	( ) %	Options
	In-kind	0.410	million USD ($)	MoEPA	( ) years	( ) %	Options
	Grant	0.600	million USD ($)	MoEPA (MoA)		( ) % IRR	Options
	Grant	7.272	million USD ($)	MRDI			Options
	Grant	1.000	million USD ($)	City of Tbilisi			
	In-kind	0.051	million USD ($)	City of Tbilisi			
	Grant	5.000	million USD ($)	SDC			
	Grant	16.538	million USD ($)	MIA			
	Lead financing institution: n/a						
	** Please provide a confirmation letter or a letter of commitment in section I issued by the co-financing institution.*						

(d) Financial terms between GCF and AE (if applicable)

In cases where the accredited entity (AE) deploys the GCF financing directly to the recipient, (i.e. the GCF financing passes directly from the GCF to the recipient through the AE) or if the AE is the recipient itself, in the proposed financial instrument and terms as described in part (b), this subsection can be skipped.

If there is a financial arrangement between the GCF and the AE, which entails a financial instrument and/or financial terms separate from the ones described in part (b), please fill out the table below to specify the proposed instrument and terms between the GCF and the AE.

Financial instrument	Amount	Currency	Tenor	Pricing
Choose an item.	……	Options	( ) years	( ) %

Please provide a justification for the difference in the financial instrument and/or terms between what is provided by the AE to the recipient and what is requested from the GCF to the AE.

B.3. Financial Markets Overview (if applicable)

6. Only a qualitative financial market overview has been undertaken for the project due to the public good nature of the project interventions and the limited commercial market for the climate services to be developed by the project (See Table 2 in the new Section C.5. Market Overview for profile of climate services customers).

The project is developing a multi-hazard early warning system which is an essential element of any country's climate risk management framework and which will serve 1.7 Million ordinary Georgians currently at risk from climate-induced hazards. A cost-benefit analysis has been undertaken for the project as a means of assessing its viability (See annex XIIa and b) with benefits calculated based on:

- Damages avoided to property and agriculture from the construction of flood mitigation works at 13 locations short listed in both East and West Georgia
- Savings in damages to flood plain properties located in Georgian fluvial flood plains because of timely warnings to the public at risk through investment in Flood Forecasting and Multi-Hazard Early Warning Systems (MHEWS)
- Reduction in the loss of life as a result of introduction of MHEWS

7. The analysis found that the present value of benefits of the project is $80.8 Million USD. Given the nature of the main beneficiaries of the climate information services who are ordinary Georgians with no means of paying for such services, and given the fact that these services are the statutory obligation of the GoG to provide, it is unlikely that any commercial sectors will provide a significant long-term customer base to leverage their funding against these present value benefits. Several commercial sectors have been approached to gauge their willingness to pay for climate services including Hydropower sector, infrastructure investment and development sector (see letter of support from the Georgian Co-investment Fund – Annex IV) and insurance sector. While these sectors will benefit from the climate information services and will continue to pay for such services, together they will not provide the weight of financing needed to match the present value benefits.

8. With regard to DRR financing, it should be noted that there is government willingness to make financial resources available for sectors that contribute to risk reduction (such as environmental sustainability, climate change adaptation, etc.). However, the state budget has no specific DRR annual allocation. Moreover, in the light of recent economic fall,

the 2017 state budget is significantly cut for almost all budget categories, as recommended by IMF and other international finance organizations and if the situation is not improved, further reduction of the state budget is expected for 2018 and beyond. Resources allocated throughout different sectors are not coordinated, prioritised, systematised or regularised. Similarly, there is no specific annual recovery allocation in the state budget. Disaster response allocations are made through specific requests to the Ministry of Finance based on damage and loss assessments and calculations of costs, which are not made based on international standards. According to the Ministry of Finance, the allocation of extra funds must be approved by the Parliament.

9. With regard to the potential for partial GCF loan funding for this project, the following is a statement of the GoG position:
"According to Moody's rates Georgia has "Ba3" - rating balances high growth rates with a small economy and low GDP per capita. Ranking is about creditworthiness, however, it does not state about country's capability for taking loans. Investment projects financing that are envisaged by loans from various financial institutions and donor organizations in the medium term are already agreed (Practically all investment projects for next four years are identified and reflected in medium term fiscal plans). Accordingly, taking additional loan even for such an important project will negatively affect the debt sustainability. In addition, Georgia has already agreed the main fiscal parameters with the IMF and Government do not want to put this agreement under the risk. The development of early warning systems is a priority for the country, therefore government mobilized co-financing to the GCF project which amounts USD 45.5 million (including grants and international loans for Government of Georgia) and involves key governmental and municipal authorities. This is the reason why Georgia is insolvent to refund additional foreign dept. Therefore the country is not in a position to get an additional loan for that purposes"[5].

[5] Email response from Gizo Chelidze. Head of the Department of Integrated Management of Environment (Water, Air, Land, Climate Change). Ministry of Environment and Natural Resources Protection of Georgia

C.1. Strategic Context

Climate Change impacts and vulnerability

10. Due to the complex mountainous terrain and climate, Georgia is subject to both geological and hydro-meteorological natural hazards including landslides, mudflows, erosion, avalanches, floods and flash floods, drought, and strong winds. There is evidence that frequency of these climate-indiced disasters and associated damages have been increasing over the past decades. Climate change studies[6] have indicated that these hazards will further increase in frequency, intensity and geographical spread over time and will have significant negative impacts on various sectors, including agriculture, health, critical infrastructure, tourism and protection of culture heritage, environment, natural resources and ecosystems. Georgia's Second and Third National Communications to UNFCCC as well as other studies provide evidence that further escalation of geological and hydrological processes is expected until 2050. The climate change scenarios indicate more extremes as prolonged rainfall events, concentrated in a short period of time with the potential to generate more runoff during these short periods, thereby increasing the potential for flash flooding (due to high peak river flows), mudflows and landslides. The trend of increasing average temperature for all seasons, decreasing precipitation and longer duration of dry periods, which will persist until 2050 in already dry areas will further increase the risk of droughts. Currently, the number of days with precipitation more than 50 mm and 90 mm rainfall will be reduced in almost entire East Georgia by 2050. In lower courses of Alazani and Iori River Basins, located in south and south-east municipalities of Kakheti region, crop and irrigation water demand will increase due to prolonged warmer, drier periods, but will be offset to some extent by greater duration of wet periods. By the end of the century, the trend will be more towards prolonged droughts rather than towards wet periods therefore, dry areas of the country already affected by the climate change will become more vulnerable. More specifically, Kvemo Kartli will stay the driest region as it is now. South and southeast municipalities (Sagarejo, Dedoplistskagro, etc.) of Kakheti region and Shida Kartli, which are also prone to droughts will continue to be susceptible to this phenomenon.

11. Over the last 21-year period total damages from hydrometeorological hazards were GEL 2.8 billion ($1.2 Billion USD) at a cost of 152 lives (22 of which occurred in the Tbilisi flash flood of 2015). Floods, landslides and mudflows make up 60% of these damages/losses and 67% of loss of life. National disaster statistics indicates that there is growing trend in cumulative damages and losses of lives from floods, droughts, avalanches, wind storms and hails over the last 20 years. The damages from single extreme events range from over 300 million GEL ($121 Million USD) which was attributed to 2000 extreme drought, to 700 Million GEL (US$ 283 Million) attributed to the 1987 flood. In addition, natural hazards have resulted in internally displaced eco-migrants from economically disadvantaged areas.

12. Economic assessment of the impact of hydrometeorological hazards under climate change conditions[7], shows that 1.7 Million people (40% of the population) including the most vulnerable communities in remote rural and densely populated urban areas are at risk from the main hazards. Annual average damages (AAD) to properties from floods are estimated at 116.3 Million GEL ($US51.2 Million) without climate change and at 282.7 Million GEL ($US 124.4 Million) with climate change. The risk to agricultural land from all hazards is between 251,225 ha and 325,020 ha under baseline and climate change conditions respectively. Annual damages to agriculture from flooding alone would be 126.3 Million GEL (55.6 Million $US) and 154.2 Million GEL (67.8 Million $US) under baseline and climate change conditions respectively.

13. Regional flood risk profiles indicate that flood plains in Racha-Lechkhumi-Kvemo Svaneti and Samegrelo-Zemo Svaneti in Western Georgia have almost 50% of their flood plain population at high risk whilst 68% of the flood plain population in Ajara and 47% in Guria are at low risk. Risk for the other regions is largely balanced across the three zones. Under Climate Change scenarios those at medium risk will tend towards high risk over time especially in Western

[6] Georgia SNC and TNC

[7] At feasibility stage only broad-brushed national-scale hazard mapping was available. Climate change has been assessed based on an assumption of escalating hazard conditions by assuming current hazard is intensified to the next hazard category above it. Hence low hazard becomes medium and medium hazard adds to high hazard etc. This re-categorisation is assumed to be valid for the project planning horizon of 27 years. It should be noted that detailed hazard modelling and mapping incorporating climate change parameters will be undertaken during the full project under Activity 1.2.

Georgia when it is conjectured that, with the exception of Ajara, around two thirds of flood plain population, especially in Western Georgia, will become subjected to higher risk.

14. Some 269,377 (22.8%) people live in Droughty or Dry zones in Georgia with 7.3% in the extreme droughty zone. Kvemo Kartli has over 58% of its population in the droughty zone and this rises to almost three quarters under climate change. Tbilisi region currently has less than 2% of its population in the droughty zone but this will increase to almost 50% under climate change. With the exception of Kakheti with less than half a per cent in the droughty and dry zones no other region presents as being at risk from drought both currently and into the future. Some 83,633 Ha of agricultural land is currently affected by severe drought conditions with a potential to rise to 149,302 Ha. Almost 100% currently is in Kvemo Kartli Region though in the future some 14,016 Ha could be affected in Kakheti, (primarily a wine producing Region), an 18-fold rise on present day.

15. Some 79,903 (5.4%) properties are exposed to powerful (> 14 to 18 days per year) and moderate (14 to 18 days per year) hail risk in Georgia, with 1.3% exposed to powerful risk. Some 90% of agricultural land affected by severe hailstorms is currently in Kvemo Kartli though future climate change will potentially increase the area of land affected by over threefold with Kvemo Kartli joined by Samgerelo-Zemo Svaneti as the most severely affected Regions.

16. Some 95,376 (6.5%) of properties in Georgia are within the two severe wind zones with 1.1% in the most severe zone. Currently 7,131 Ha of agricultural land is at the severest risk conditions roughly split between Racha-Lechkum-Kvemo Svaneti and Shida Kartli. However, in the future almost 60% of risk from severe wind will be within Imereti where risk now is negligible.

17. Some 29 properties in Georgia are situated in very strong avalanche zones largely in Mtskheta-Mtianeti. This rises to 3,288 (0.22%) properties under climate change with 1,602 in Mtskheta-Mtianeti. Achara has 862 properties exposed to strong or very strong avalanches with 284 in Samagrelu-Zemo-Svaneti and 237 in Samtskhe-Javakheti.

18. In general, around 70% of the country's territory, 3,000 settlements (62%) and 400,000 households are under the risk of geological disasters. Some 14.2% of agricultural lands have been seriously damaged by geological processes and require conducting of cardinal protective measures, with 13.1% of agricultural lands located within the high-risk area. The largest number of recorded landslides is in Imereti (28.6%) followed by Ajara, Mtskheta-Mtianeti, Racha-Lechum-Kvemo Svaneti, each with a little over 10% of Georgia's total.

19. Hence, hydro-meteorological hazards are intensifying over time, and increasing in spatial distribution. These spatio-temporal changes in hazards will together negatively impact communities in Georgia including socio-economic impacts. The increase in numbers and severity of observed hazards as recorded in the hazards database, and the increase in spatial distribution of each hazard as outlined above, demonstrates the intensification of hydro-meteorological hazards in time and space.

20. Negative impacts of climate-induced hazards on the natural resource base on which rural communities rely for their livelihoods, and the resultant socio-economic impacts on rural populations, are significant and will exacerbate the vulnerability of those communities in the future.

21. There is no nation-wide hazard forecasting early warning system in the country. The most complete and integrated almost real-time EWS for flood/flashfloods was recently developed and operationalized for the Rioni River Basin, developed under the UNDP project financed by the Adaptation Fund (Rioni project). For other basins, as well as for other climate-induced natural hazards, there are no such completed and integrated system.

Adaptation and CRM policy context

22. Given the current and future vulnerabilities of the Georgian population to climate change and related natural hazards, in 2015 the Ministry of Environment and Natural Resources Management on behalf of the Government of Georgia developed and submitted to UNFCCC its Intended Nationally Determined Contributions (INDC), with a main objective to improve the country's preparedness and adaptive capacity by developing climate resilient practices that reduce vulnerability of highly exposed communities. Development and implementation of National Adaptation Programme and sectoral adaptation plans, including agriculture adaptation plan as well as establishment of early warning systems for climate related hazards are considered among top priority measures under INDC. The INDC refers specifically to all

natural hazards identified within the context of extreme natural events aggravated by climate change, and identifies agriculture, coastal zones, tourism sector development, forestry and the health sector as at-risk sectors. The INDC also outlines the need for continuous development of national and local capacities for implementation of adaptation actions for 2021-2030. Furthermore, Third National Communications apart from GHG inventories and mitigation measures offers a wide menu of climate adaptation actions, including sectoral adaptation and the recently launched Fourth National Communication that will focus on removing legal-policy and institutional barriers towards better integration of climate change adaptation into development and sectoral policies and programmes.

23. Reducing the risks of climate-induced natural hazards is addressed in various national DRR-related strategies and plans. The major document - National Strategy on DRR, adopted in 2015 under the leadership of the State Security Council functioning within the auspices of the Prime Minister's Office focuses on reducing risks of climate-induced hydro-meteorological and geological hazards. In this regard, it targets five strategic areas: i) ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation; ii) identify, assess and monitor disaster risk and enhance early warning; iii) use knowledge, innovation and education to build a culture of safety and resilience at all levels; iv) deduce the underlying risk factors and; v) strengthen disaster preparedness for effective response at all levels. Capacity development activities under the monitoring and early warning pillar target the development of unified methodology and tools for multi-hazard risk assessment, mapping and monitoring; a centralized multi-hazard disaster risk information and knowledge system, consisting of national e-Library, databases, information systems and knowledge portal; local-level detailed hazard mapping and risk assessment by hazard and sectors; and end-to-end multi-hazard nation-wide integrated early warning system (EWS). Recently, a National Action Plan on Disaster Risk Reduction (DRR NAP) for 2016-2020 stipulating from the national DRR strategy was finalized. In the area of risk reduction of climate induced natural hazards the actions planned comprise soft and hard measures, including improvement of risk knowledge, preparedness, resilience, implementation of preventive/protective structural measures, public awareness and education, planning and implementation. The most recent development in the area of DRR/EWS is the process of preparation of National EWS concept paper under the coordination of the Ministry of Internal Affairs. The document consists of five components/outputs, including elaboration of relevant legal-regulatory basis for EWS, systematic data collection on hazards and risks from various sources, setting common rules and means for communications, development of a system for regular data collection, processing, analysis, risk assessments, effective information dissemination and communications, strengthening national and local response capacities through public awareness campaigns, development of disaster response plans and response capacities and, development of human resources.

24. Concerning integration of climate change considerations into various sectoral strategies and plans, there is a number of documents adopted or under development that reflect various aspects of climate change vulnerability and adaptation. The National Environmental Action Plan of Georgia focuses on reduction of risks from climate-induced natural hazards as means for climate adaption. The Agriculture Development Strategy, among various priorities, focuses on climate smart agriculture and food security. Adaptation Plan for Agriculture Sector is currently under development and also includes provisions for climate-smart agriculture.

C.2. Project / Programme Objective against Baseline

25. The project objective is to reduce exposure of Georgia's communities, livelihoods and infrastructure to climate-induced natural hazards through a well-functioning nation-wide multi-hazard early warning system and risk-informed local action. The project will achieve this by nation-wide scaling-up of several projects and initiatives such as of the Rioni Basin flood forecasting and early warning system (FFEWS). The scaling up will be attained by developing and implementing a nation-wide Multi-Hazard Early Warning System (MHEWS), developing and delivering climate information services, implementing community-based risk reduction measures which will reduce exposure of the most vulnerable local communities to climate-induced hazards. The project will address existing gaps/barriers towards establishing an effective functioning, fully-integrated Multi-Hazard Early Warning System.

Baseline scenario

26. To date, hydrometeorological hazard risk management has been dealt with in an *ad hoc* and reactive manner, relying on measures such as hard structural protection measures which are expensive to build, provide limited standard of

protection and have a limited service life; emergency response once a disaster unfolds, with limited reliance on forecast of the event or satisfactory prior warning of the population, and with limited centralised resources; and post event compensation to victims, including medium and long-term relocation out of the hazardous areas (so called eco-migration); and post event recovery and disaster risk reduction.

27. The baseline financing of DRR and CCA by GoG has been low and reducing over the years. The state budget has no specific DRR annual allocation, resource allocation is throughout different sectors which are not coordinated, prioritised, systematised or regularised. Disaster response allocations are made through specific requests to the Ministry of Finance based on damage and loss assessments and calculations of costs, which are not made based on international standards. As for the operational budgets of important agencies, in 2017 the State Security and Crisis Management Centre (SSCMC) annual budget is defined at 3.8 Million GEL (approximately US$1.58 Million), which is only 73% of 2016 budget and 55% of 2015 budget. The average annual budget of the National Environment Agency (NEA) between 2006 and 2015 was approximately 3.74 Million GEL, of which some 70% were allocated to hydrometeorological and geological monitoring, including communications, during that period. Since 2014, when NEA became a fully self-financed agency, the annual budget increased to 2.3-2.6 times the annual average values and totalled 8.6 Million GEL in 2014 and approiximately 10 Million in 2015. Sub-Activity 2.1.2 will specifically address this barrier, building on cost-benefit tool to be developed in Activity 1.3 1.

28. Post-disaster recovery and disaster risk management are funded through the reserve funds of the President and the government managed by the Ministry of Finance, budgets of the sectoral ministries and municipal budgets. Funds are primarily spent on the rehabilitation of roads and bridges, water supply systems, energy infrastructure (transmission lines, sub-stations, pipelines, etc.), various buildings as well as on the purchase of houses for ecomigrants and direct compensation of affected population. In accordance with official data, in 2014-2015, 68.369 million GEL was spent from the Prime Minister's reserve funds through the Ministry of Regional Development and Infrastructure (MRDI), construction companies, Ajara Autonomous Republic, United Water Supply Company of Georgia and local municipalities. MRDI through its Road Department during the period from 2007 through 2014 spent 46.960 million GEL on the rehabilitation of road infrastructure, including construction of flood defence structures. Average annual spending by the Road Department is about 5 million GEL (US$ 2 mln). The total amount spent on recovery and rehabilitation works annually is significant, but still is very small compared to annual average losses. This reactive approach to disaster risk management is neither efficient not effective and would be even less so under the expected increased frequency and increased damages and losses that would result from climate change.

29. With annual losses from flooding alone estimate at 126.3 Million GEL, it is clear that the budgets of the key state institutions as well as the allocations from the President's reserve fund are grossly inadequate to address the risk and potential losses from all hazards facing Georgia annually. The whole project is aimed at addressing this reactionary approach to disaster risk management. Specifically, all of Outputs 1 and 2 are addressing this. On the issue of risk financing, Sub-Activity 2.1.2 will specifically address this barrier, building on the cost-benefit tool to be developed in Activity 1.3 1. Furthermore, the project will address risk information gaps to enable the development of a national catastrophe insurance scheme (beyond the scope of this project), which, in the future, could be an effective risk transfer instrument to replace the existing post-event compensation approach to addressing disaster damages and losses.

30. In the baseline scenario without GCF investment, Georgian population and economy will be facing increasing pressures from more frequent and severe climate induced natural disasters due to climate change. Losses of lives and economic losses due to climate-induced disasters and associated impact on GDP and sovereignty credit rating will be increasing. Scaling-up of tested EWS will not be possible due to the existing financial gap between CRR needs and investments, underdeveloped national capacities for inadequate hazard and risk knowledge for all major basins in Georgia, as well as due to a lack of monitoring stations on which such risk knowledge relies.

Key baseline projects to scale-up and other initiatives to cooperate with

31. The GCF proposal will scale-up pilot activities and achievements of the UNDP project ***Developing Climate Resilient Flood and Flash Flood Management Practices to Protect Vulnerable Communities of Georgia*** (Rioni project) financed by the Adaptation Fund (2012-2017) as well as another UNDP project ***Strengthening National Disaster Risk***

***Reduction System in Georgia*.** In addition, the GCF project will implement recommendations arising from the 2015 Tbilisi Disaster Needs Assessment Report prepared by the World Bank, UNDP and USAID experts and 2015 Tbilisi Disaster Recovery Vulnerability Reduction Plan supported by UNDP in particular, its soft components related to EWSs - risk knowledge, monitoring, warning and dissemination and response.

32. The main project being scaled up is the Rioni project (2012-2017, US$ 5 Million), which was funded through the Adaptation Fund. Under it, UNDP supported the government and municipalities in the Rioni basin with total population of around 200,000 direct beneficiaries and approximately 500,000 total beneficiaries. The project included direct interventions in 6 pilot municipalities - four upstream municipalities (Tsageri, Lentekhi, Oni and Ambrolauri) and 2 downstream municipalities (Samtredia and Tskaltubo). The Rioni project piloted an integrated approach to flood risk management. The approach involved: i) development of policies, guidelines and tools, and recommendations to enhance the flood risk management legislative and policy framework in the area of floodplain zoning and weather index-based flood insurance; ii) establishment of fully-integrated Flood Forecasting and Early Warning System (FFEWS), through upgrading of 5 meteorological stations, 20 meteorological posts and 10 hydrological posts as well as installing several landslide monitoring equipment (inclinometers) in upper and lower watersheds of the basin; iii) digitizing and visualizing historic data and creating a unified archive for both meteorological and hydrological data; iv) introducing modern hazard and risk hydraulic and hydrologic modelling and mapping and, establishing and running of Delft-FEWS platform for the Rioni River Basin; v) capacity building and training of the NEA's staff in modelling; vi) running FFEWS and operatizing and maintaining new equipment; vi) construction of flood defences, stabilization and restoration of riverbanks and shores according to the best international practices in 12 high risk areas, using bioengineering (agroforestry, floodplain restoration) and hard structures such as rip-rap boulders and gabions.

33. The GCF project will scale up the prototypes piloted by the Rioni project (including the hazard mapping, floodplain modelling, floodplain zoning and EWS) to include the other river basins and regions of Georgia and to encompass a broader range of key climate-induced hazards. More specifically the following key elements of the Rioni project are being scaled up within the GCF project:

- Hazard and risk assessment, modelling and mapping – Rioni project introduced comprehensive international best practice in this area and provides the basis for standardising the methodologies and approaches across Georgia, based on EU Flood Directive methodologies which will be a requirement for Georgia under the Association agreement. In addition, some capacity for hazard and risk assessment, modelling and mapping has already been built under the Rioni project. **Activities 1.2, and 1.3** of the GCF project will scale up and extend the hazard, and risk modelling and mapping to the rest of Georgia and will extend it to other hazards.
- Hydrometric network expansion and optimisation for the main purpose of FFEWS and strategic hazard management – Rioni project has done this for the whole basin and has linked to the expanded hydrometric network to a FFEWS system. In addition, capacity has been built in the installation and maintenance of hydrometric networks. **Activity 1.1** is scaling up the hydrometric network expansion undertaken by Rioni project to cover the rest of Georgia.
- Institutional capacity development in DRR and CCA – The Rioni AF project has assessed this specifically with respect to flood and landslide hazards and has developed short and long-term capacity development plans. **Activity 3.2** is scaling up some of the capacity development in climate risdk assessment and modelling and implements some of the recommendations of the capacity development plan developed by the Rioni projects.
- Development and installation of an early warning system – Rioni AF project has been the first project to develop a comprehensive forecasting and early warning system for one of the most important hazards facing Georgia. The platform was designed to be extended geographically to cover the rest of Georgia and to include a number of other hazards. The Rioni project also comprehensively addressed institutional arrangements, communications and dissemination and response for EWS, and made detailed recommendations of appropriate arrangements that will need to be implemented for the national EWS. **Activity 2.4**, is scaling up the development of an early warning system to include the implementation of an impact-based MHEWS for the whole of Georgia. **Activity 3.1** is a further extension of the early warning system to include community based early warning systems.
- Interventions – structural measures – Rioni project has introduced climate-informed design and construction approaches and piloted a number of different types of structures such as boulder embankment gabion baskets

which can be implemented elsewhere based on the Rioni experience. It has also implemented innovative agro-forestry measures as standalone 'non-structural measures' as well as in combination with structural measures. It has developed municipality-based employment guarantee schemes for engaging local populations in the implementation and maintenance of risk reduction measures. **Actvitity 3.3** is scaling up structural intervention measures successfully designed and constructed in Rioni and leans on the best practices developed for Rioni.

- A key and innovative non-structural measure suggested by the Rioni project is the weather index insurance which could be a key financial risk transfer mechanism for DRR financing in the future. The insurance scheme developed for the Rioni project will not be scaled up as part of the GCF project. While the risk and insurance model and scheme were successfully developed, national coverage needs the hazard and risk modelling that the GCF project will provide. Once this is completed, the insurance sector with the GoG can take this forward. Based on consultations undertaken for the Rioni project, there is currently a lack of enabling environment for this scheme to be implemented within the lifetime of the GCF project.

34. UNDP Project "**Strengthening National Disaster Risk Reduction capacities in Georgia**" was aimed at increasing national capacities for DRR to enhance the resilience of the population through mainstreaming DRR in development and sectoral policies and plans and building national preparedness capacities for effective response at all levels. The project assessed the situation concerning the MHEWS and based on its findings made concrete recommendations. Furthermore, the project developed an outline for Multi-hazard Risk Assessment Methodology which will need further elaboration and relevant capacity building. In addition, the report identified institutional and staff-level capacity gaps and barriers including lack of legal and institutional framework for well-coordinated EWS, duplication of roles and responsibilities between key agencies, weak capacities and infrastructure for systematic data collection, analysis and forecast, low public awareness. The report suggested implementation of such measures as: i) multi-hazard risk assessment (based on agreed methodology and standards); ii) improvement of communication/cooperation and strengthening data exchange mechanisms between scientific institutions and government agencies; iii) storing and updating DRR data and information in one central repository national disaster data base and introducing procedures and regulations ensuring open access and data sharing from all relevant stakeholders at all levels; iv) integration of risks assessment into local risk management plans and warning messages and development planning; v) upgrading hydrometric network, vi) enhancing NEA's forecasting and modelling capacities, vii) clarification of roles between various agencies in terms of warnings and communications and development of relevant SOPs; viii) enhancing disaster preparedness and response capacities at all levels and developing/updating municipal response plans. Key findings of this project are outlined in institutional and barrier analysis of the feasibility study and, most of the GCF project outputs and activities are based on recommendations to address them.

35. Following the Tbilisi floods of June 2015, in response to the request from the GoG to UNDP and World Bank to undertake a rapid needs assessment, a team of national and international consultants from UNDP, the World Bank, the Global Facility for Disaster Reduction and Recovery (GFDRR) and the United States Department of Agriculture (USDA) joined Georgian government and Tbilisi City Hall experts to conduct the ***Tbilisi Post-Disaster Needs Assessment (PDNA)***. The assessment was led by the Georgian Ministry of Finance and was co-ordinated by Tbilisi's City Hall. The government identified the following sectors as a priority for the assessment: housing, transportation, water management, the zoo, and Disaster Risk Reduction (DRR) as a crosscutting sector. The study team has come up with medium and long-term recommendations highlighting the need to ensure a detailed understanding of the hazard and risks posed by the combination of hydro-meteorological hazards that can affect Tbilisi – multi-hazards risk assessment, the need to develop and implement a detailed master plan, based on the detailed hazards assessment, of the structural and non-structural measures, the need to reconsider floodplain development and relocation of at-risk infrastructure such as the zoo and to build a more resilient public transport system and public spaces, i.e. adopt a floodplain zoning policy that includes building flood resilience and resistance into the planning and building of critical infrastructure. The PDNA specifically highlights the need to adopt a comprehensive multi-hazard early warning system as one action in protecting the public and minimising the loss of life and minimisation of losses. The recommendations of the PDNA are therefore fully aligned with the approaches to managing flood risk that have been developed and introduced by the Rioni project, and which the GCF project is seeking to scale up. Given the density of the population of Tbilisi, the density and criticality of the urban infrastructure at risk from flooding, specific activities will be implemented under the GCF project to address the medium and long-term recommendations of PDNA, and to address barriers specific to Tbilisi, which currently limits its ability to cope with major hazards such as the 2015 event. The City of Tbilisi development of Multi-hasard response,

preparedeness and resilience plan for the City of Tbilisi under **Activity 2.4,** which will be co-funding to this project is scaling up the recommendations of the PDNA.

36. There are some other on-going projects that the GCF project will cooperate with, as well as completed projects whose relevant experience, knowledge and approaches will be applied to the extent possible. Specifically, The GCF project will cooperate with and build upon the outcomes of 2016-2018 EU project Prevention, Preparedness and Response to Natural and Man-made Disasters in the EaP countries – PPRD East 2 and EU Water Initiative Plus for the Eastern Partnership (EUWI+4 EaP) on strengthening national capacities of EaP countries for implementation of Water Framework Directive to be implemented in 2017-2020 in aspects of river basin management planning. Furthermore, it will build upon FAO's technical support provided to the MoA in climate-smart agriculture and establishing of EWSs for droughts.

37. Lessons learned and best practices of other completed or on-going projects addressing climate and/or disaster risks are also taken into consideration in particular, community-based initiatives that focus on community-based resilience projects in the areas of community-level participatory climate and disaster vulnerability assessments, community climate adaptation and DRR planning and watershed/floodplain restoration and agroforestry through small grants-making. These projects are USAID/GLOWS Integrated Natural Resources Management in Watersheds of Georgia project (INRMW), UNDP/GEF Small Grants Programme, USAID/CENN climate adaptation project. Despite the baseline programmes and projects described above there are still a number of barriers preventing Georgia from addressing vulnerability to climate induced hazards and risks.

Key barriers to fully-integrated MHEWS and an enhanced use of climate information

Barrier 1. Lack of financial, technical and human capacities within the government to establish nation-wide multi-hazard hydro-meteorological risk, monitoring, modelling and forecasting

38. A key barrier to comprehensive forecasting and early warning is the lack of adequate hydro-meteorological monitoring networks, forecasting models and resources for all basins. This includes a lack of adequate real time automatic observations (due to inadequate hydrometric network) and a lack of human and financial resources to implement and maintain a national system for all appropriate hydrometeorological hazards. In addition, there is no definitive hazard, risk or vulnerability mapping for Georgia for any of the hydrometeorological hazards that it faces. The technical and financial capacity to undertake such mapping is lacking. This represents a barrier to effective hazard and disaster risk management in Georgia and needs to be addressed in order to enable risk-informed development decisions on which the socio-economic future of Georgia depends, reduce the risk to acceptable levels and to manage any residual risks using methods such early warning. NEA capacities for flood and landslide hazard and risk assessment and forecasting have been significantly strengthened through the Rioni project but needs to be further supported as the system will be expanded nation-wide and will integrate the new data sources. At the same time, there is limited experience in the use of new forecasting modelling technologies of the other climate-induced hazards that will be covered by the MHEWS.

Barrier 2. Gaps in the legal, institutional and coordination frameworks for the MHEWS and enhanced use of climate information

39. While there have been great strides made in improving the institutional arrangements for the EWS, there is still a lack of clarity with respect to roles and responsibilities in this regard. As the institutional reform continues, there is no national protocol for the MHEWS. Various components of the system are not integrated/harmonized. The new Joint Operations Center established under the MIA in 2016 to conduct real-time observation of all emergency situations including natural disasters, and to communicate warning to relevant agencies, is not fully operational or resourced as yet. Its role and capacities in this regard are still unclear. Clear communication lines between different agencies, Standard Operational Procedures (SOPs), communication protocols and Codes of Conduct are lacking within the agencies responsible for the various elements of the MHEWS and response. Multi hazard risk assessment and vulnerability assessment mandates and methodology are not finalized and not enforced, resulting in duplication and inefficiencies. Furthermore, there are profound institutional capacity gaps related to the risk management and response at the local/municipal level. Adequate protocols and SOPs as well as organization units directly responsible for disaster

prevention, preparedness and response are missing in the capital city of Tbilisi. These capacity gaps manifested themselves during the latest devastating disaster that hit Tbilisi in 2015.

40. Similarly, there are gaps in the existing legal and regulatory framework for water management and disaster risk reduction that would prevent operationalization of the MHEWS and integration of climate risk information in decision-making. There is an on-going work coordinated by the MoENPR in Georgia to develop framework legislation on water and flood risk management guided by the EU directives. Technical support is required to accelerate development of technical guidelines and other regulations for these framework laws.

41. While technical expertise exists in various sectors and for specific technical areas, awareness and knowledge of climate risk management concepts and practices is an area for improvement. Technical capacities related to risk identification and assessment, risk prevention/mitigation, risk reduction, risk transfer, preparedness, climate risk management and climate change adaptation are rather weak across institutions and governance levels. As part of the Rioni and DRR projects, an assessment was made of the existing gaps in institutional capacity for all aspects of flood and landslide hazard and risk management in Georgia. (Please see FS Annex 5 for detailed capacity assessment).

Barrier 3. Climate information is not effectively delivered and utilized for the national, sectoral and local planning and decision-making

42. Climate risk information is not being systematically used to inform national, sectoral and local planning, mainly due to the lack of comprehensive and definitive national hazard and risk mapping. Hence activities within key sectors such as water management, energy, transport, agriculture, forestry, spatial planning, are not risk-informed and do not take account of climate change. In addition, sectors lack the sector resilience and preparedness plans which would enable them to manage hazards and minimise the impacts to people, critical infrastructure, and normal economic activity within the sectors. With regard to the climate risk information which will help to prevent or minimise the impact of imminent hazardous events, seasonal forecasts are provided for some hydrometeorological hazards (e.g. floods and droughts) in the form of bulletins, while geological hazards are forecasted and information disseminated in an annual bulletin. For high-impact imminent hazards, the initial responsibility for warnings lies with NEA who has limited capacity to issue specific and targeted warnings to enable effective response. Warnings are not tailored to user needs and, as forecasts do not always indicate the area at potential risk, the messages are not geographically-specific. Moreover, warnings do not contain specific information on the potential impacts.

43. Agrometeorological monitoring is limited to 24 micro-scale automated agrometeorologcal stations operated by the NFA and 4 outdated stations operated by NEA. Current functioning network is designed to automatically forecast pest outbreak that is then used for advising farmers on pest control measures. Other forecasting and advisory products are not developed at all, including drought and frost forecast, short, medium and long-term weather and climate forecasts and related planting/crop and irrigation calendars, etc. While MoA held new agrometeorological data generated at 24 stations, it was lacking relevant hydrometeteorological and agrometeorological expertise. Meanwhile, NEA has such expertise, but lacks necessary infrastructure and up-to-date agrometeorological data as well direct communication lines with farmers, as end-users of warnings on unfavourable agrometeorological conditions and relevant advisories. Cooperation between NFA and NEA is currently absent.

44. At present, planning platforms for multi-hazard risk management, including disaster preparedness and response plans do not exist at regional (river basin), municipal and community levels, nor do the relevant methodological and knowledge base for carrying out climate-informed planning exercises.

Barrier 4. Insufficient adaptive capacities and outdated risk reduction solutions for effective community-based climate risk management (CBCRM), including CBEWS

45. In Georgia, flood defence and flood risk management is done in a reactive manner and as budgets allow. The Ministry for Regional Development and Infrastructure (MRDI) uses its limited annual budget to address urgent repair to riverbank defences, which does not currently take a strategic approach (e.g. river basin approach) and does not take account of climate change. During the Soviet era, there was a significant programme of flood defence construction, almost exclusively, as a means of flood risk management. Most structures built in that era, have not been upgraded, or maintained have now exceeded their design life and are therefore now largely ineffective for protection against current,

let alone, future hazards. Furthermore, in the modern era, flood risk management is now a mixed approach, which combines both structural and non-structural measures (as done under the UNDP project for the Rioni basin). In terms of design standards for flood defences, levels are normally defined as the 1% (or 1 in 100 year) event for rivers and 0.5% for coastal defences, subject to the proposed scheme being cost beneficial and environmentally sustainable. It also depends on what is being protected behind the defence (1% Annual Exceedances Probability (AEP) being the minimum standard for populated areas). Allowances need to be made for climate change and other future scenarios, which should be reviewed and updated frequently as further research is undertaken and knowledge is improved.

46. A significant gap to be addressed for an effective MHEWS is related to the "last mile" communication and delivery of the warnings to the local communities and an enhanced community-based risk reduction. There is no experience in Georgia in community-based EWS. Clear communication protocols and SOPs are required at all levels. Community based organizations are neither informed about risks nor empowered for action. Some community-based climate risk reduction approaches (e.g. agroforestry, restoration of floodplain zones, etc.) have been piloted by various international projects, including the Rioni project, but have not been scaled-up.

Adaptation Alternative

47. In order to deal with the hydrometorological hazards that are intensifying due to climate change, Georgia needs to move towards a more proactive integrated risk-informed approach centred around early warning, risk reduction, risk prevention, and preparedness. There is a need to support the commitment of the Georgian government to avoid losses of lives and to reduce economic and infrastructure losses caused by climate-induced hydrometeorological disasters through the establishment of a multi-hazard early warning system and all associated risk management approaches.

48. A multi-hazard early warning system and effective hazard emergency response rely on effective forecasting and warning, knowledge of where and when the hazards will occur (high risk areas identified by hazard mapping), engagement of all key players in the response, actions to be taken by each individual (or groups of individuals) and response/evacuation plans.

49. It relies on accurate and representative measurement of hydrometeorological variables for the provision of timely warnings to emergency responders and the population at risk. More accurate forecasts of the location and extent of the hazard will result in more effective warnings and response. In order to achieve more accurate forecasts, as well as better strategic assessment of hazards, there is a fundamental need to expand and optimise the hydrometric monitoring by increasing the density of monitoring stations over the forecast basins, which will capture the large spatial and temporal variability in hydrometeorological processes that are characteristic of Georgian river basins.

50. In addition, there is a need to have critical climate risk information that would enable the Government of Georgia to implement a number of nation-wide transformative policies for reducing exposure and vulnerability of the population and economic sectors to climate-induced hazards. There is a need to introduce and standardise hazard, risk and vulnerability assessment, modelling and mapping methods and technologies and build long-term institutional capacity for producing and updating hazard maps at a level of detail for all uses, such as spatial planning, resource planning, sectoral planning and decision making, and climate risk management.

51. At community level there is a need to improve community resilience and capacity to understand their vulnerabilities, adapt and respond to hazards, through the implementation of community-based early warning schemes and structural and non-structural community-based risk reduction measures.

52.The adaptation alternative will be achieved by nation-wide scaling-up of the Multi-Hazard Early Warning System (MHEWS), developing capacities for climate information services, enabling and embedding the use of climate risk information in sector planning and decision-making, and reduction of exposure of the most vulnerable communities to climate-induced hazards through community-based EWS and risk reduction measures.

C.3. Project / Programme Description

53. The project objective will be achieved through three outputs: i) expanded climate-induced natural hazard observation network and modelling capacities secure reliable information on climate-induced hazards, vulnerability and risks; ii) multi-

hazard early warning system and new climate information products supported with effective national regulations, coordination mechanism and institutional capacities; iii) improved community resilience through the implementation of the MHEWS and priority risk reduction measures. A brief description of the project outputs and main activities are provided here. Please refer to the log-frame and feasibility study for a more detailed description.

Output 1: Expanded hydro-meteorological observation network and modelling capacities secure reliable information on climate-induced hazards, vulnerability and risks

54. Under this output, the project will apply a unified methodology and tools for multi-hazard risk and vulnerability assessment, mapping and monitoring based on the prototype developed through the Rioni project. The project will upgrade and expand the hydrometeorological and agrometeorological monitoring network, and support establishment of a centralized multi-hazard risk information and knowledge system, consisting of national e-Library, databases, information systems and knowledge portal. Local-level detailed hazard mapping and risk and vulnerability assessment will be developed.

Activity 1.1: Expansion of the hydrometeorological network

55. This activity will address the inadequacy of the national hydrometric network and will involve the design and expansion of the hydrometric monitoring network to include the purchase and installation of the following equipment: 12 meteorological stations, 73 meteorological posts, 44 hydrological posts, 10 snow measurement stations, 20 inclinometers; 3 drones and additional corpus; 3 meteorological radars (co-financed), drone for flight control and thermal camera; visual computing appliance (VCA) for processing areal photos; geopositioning equipment; upper air sounding equipment (x2); 15 agrometeorological stations, 8 mobile discharge meters, 1 super computer for strengthening early warning system; telecommunication system equipment. A forecasting centre is already established at NEA and technical capacity was strengthened under the Rioni project. The super computer to be acquired will be a High Performanance Computer (HPC) with several nodes and 70-100 TFlops performance, with inter-node connections 56Gb / s FDR InfiniBand or 100Gb / s EDR InfiniBand. Storage: 500-1000 Tb. The hydrological stations would include solar panels, while meteorological stations, use a combination of solar panels and main connection, as the heater has been included for the rain-gauge requires the station to be connected to the electrical network (a solar panel and battery are not sufficient for the heater).

In addition, the project will provide technical assistace in the expansion of the network in the form of training and technical supervison and O&M. Below is a map of the proposed expanded hydrometeteorological network to be achieved with the GCF support.

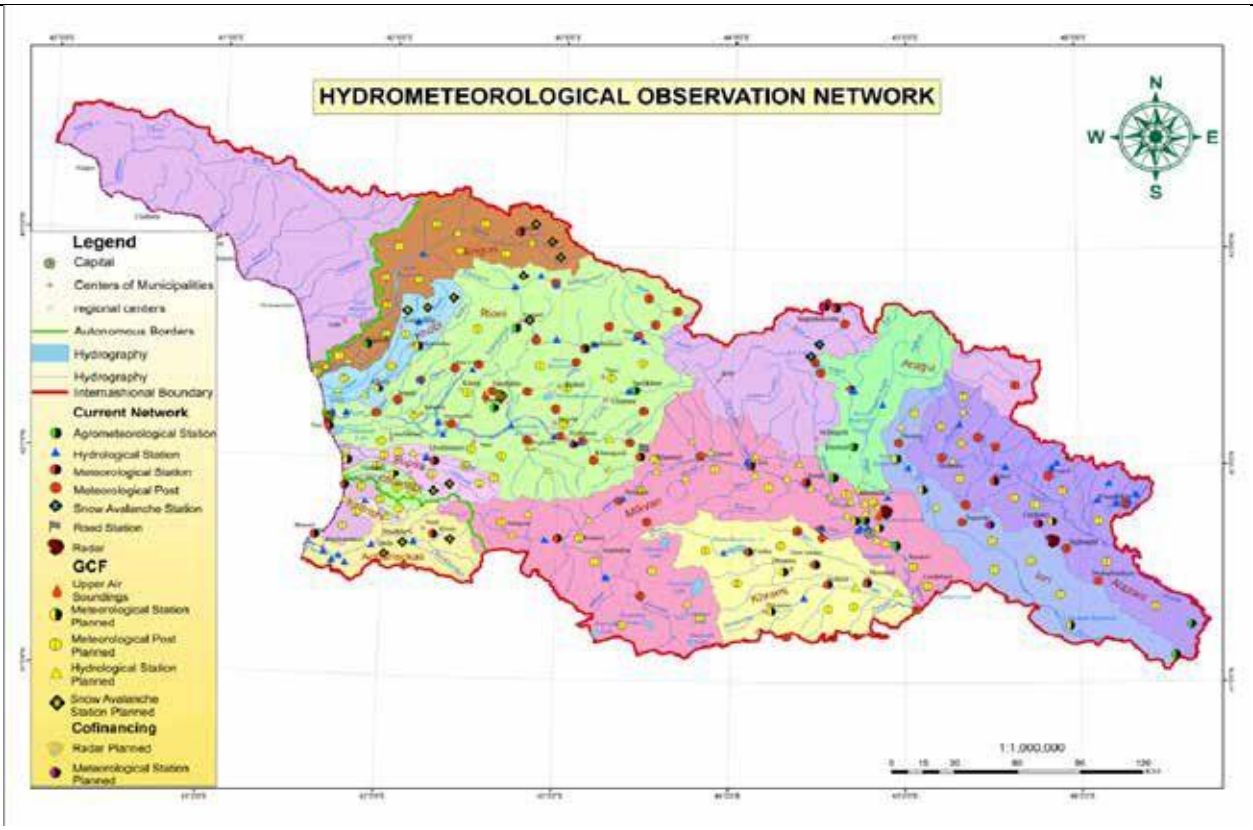

Figure 1. Suggested expanded hydrometeorological network

Activity 1.2: Risk zoning based on hazard and risk maps for all (11) major basins in Georgia and hazard and risk maps for key climate-induced hazards (floods, landslides, mudflows, avalanches, hailstorms and droughts).

56. This activity will develop the hazard, and risk maps for all hazards and all basins in Georgia and form the basis for risk zoning, spatial planning and sectoral decision making in the future. It will include the following activities:

- Development of hazard, risk and vulnerability maps for all hazards and all major river basins in Georgia.
- Introduction of modelling and mapping technology and methodologies in line with all relevant EU directives and following international best practice. Development of long-term capacity in hazard and risk modelling.
- Use of the hazard maps in development and implementation of spatial zoning policies.

Activity 1.3: Introduction and implementation of methods and tools for the systematic gender-sensitive socio-economic vulnerability assessment for decision making and prioritisation of resilience investments.

57. This activity will build on the bespoke GIS-based socio-economic risk model[8] developed for Rioni basin and extended as part of this feasibility study to include the rest of Georgia and all relevant natural hazards. The model will be enhanced with improved datasets to be acquired/established by the project but the underlying methodology will be the same. The model wil integrate the hazard mapping undertaken in Activity 1.2 which will be based on detailed hydrometerorological modelling for each hazard, using the historical hydrometric data as well as data to be provided by the improved

[8] Developing climate resilient flood and flash flood management practices to protect vulnerable communities of Georgia; Socio-economic assessment of flood risk in Rioni basin. UNDP/AF

hydrometric network to be secured under Activity 1.1, with hazard receptor data such as infrastructure (bridges, roads and buildings, hospitals, schools, power plants, critical infrastructure), land use (settlements, agriculture, grazing lands, and conservation areas), property and socio-economics data, to assess the socio-economic impacts of each hazard and produce risk and vulnerability maps for the river basins. This risk map, based on the accurate hazard mapping of the current situation will form the baseline for implementation of impact-based appraisal-led cost-benefit analysis and prioritisation of future interventions, damage and loss assessments, development of long-term risk financing models and the development of the impact-based MHEWS (Activity 2.4).

The risk score is based on consideration of the following categories of risk:

- Risk to people (risk to life, disruption to community and disruption to daily life), using people as a metric
- Risk to infrastructure, also using people as a metric
- Risk to roads, also using people as a metric
- Risk to Agriculture, using hectares as a metric
- Risk to the environment, using both objects at risk and hectares as a metric

The activity will include the following:

- Introduction and implementation of methods and tools for the systematic gender-sensitive socio-economic vulnerability assessment for decision-making for prioritisation of resilience investments
- Development and implementation of a GIS-based socio-economic risk and vulnerability model which integrates various spatial socio-economic data with the hazard maps, and produces risk and vulnerability maps, which will include economic losses and damages and loss of life estimates.
- Introduction of gender-sensitive community-based socio-economic survey technologies and techniques.

Activity 1.4: A centralized multi-hazard risk information and knowledge system

58. The activity will consist of the development of national e-Library, databases, information systems and knowledge portal (web knowledge portal to increase awareness, provide interactive hazard maps, with integration with social media and possible mobile app to increase community engagement and allow two-way flow of information). The hazard and risk assessment described in activities 1.2 and 1.3 will produce very relevant information for many different government departments and agencies. To enable access and sharing of this information, a centralised information system and knowledge sharing platform will be developed as an integral part of the NSDI currently being developed for Georgia and provide the information access and sharing platform for geospatial information on hazards. The system will represent a major shift in how government departments currently work and will be supported by the introduction of appropriate data sharing protocols and importantly by extensive training and capacity building to ensure sustainability. While the hazard-related part of the database will be hosted and maintained by NEA, as it is now, metadatabase with socio-economic parameters, including vulnerability and risk assessments will be hosted by MIA with the SSCMC having access to relevant data on disaster statistics, losses and damages and socio-economic vulnerability. Both metadatabases will be interconnected and integrated into existing EMA's GEOdata portal. Data access protocols for various concerned government agencies will be developed.

Output 2: Multi-hazard early warning system and new climate information products supported with effective national regulations, coordination mechanism and institutional capacities.

59. Under this output the project will address gaps in national coordination and institutional set up for effective EWS resulting in a functioning coordination mechanism and communication protocols for early warning. Capacities of decision-makers and national institutions involved in generating, processing, communicating and using the warnings and other climate information will be enhanced. National and local integrated Early Warning Systems by hazard and sectors will be developed and implemented.

Activity 2.1: Institutional and legal frameworks and institutional capacity building for the MHEWS and for the enhanced use of climate information. Improved coordination and communication protocols for early warning

60. The Rioni and the DRR projects reviewed the institutional arrangements for flood forecasting and early warning systems and made a number of recommendations regarding the necessary improvements for a more effective forecasting and early warning system. The GCF project will aim to implement and build upon these key recommendations to enhance the capacity to use EWS information for both the public and private sector. The activity includes the following:

- Policy, regulatory framework and technical guidance for MHEWS and climate risk management. The project will support development of framework legislation on floods management, corresponding by-laws and technical guidance informed by the EU Floods Directive and other technical guidance related to other types of hydrometeorological hazards will be developed within the climate risk regulatory framework
- Support integrating climate induced flood and droughts risks management into water legislation
- Develop and support the implementation of technical regulations and guidance on EWS
- Finalise MHRA mandates and methodology
- Clarify, roles, responsibilities and institutional arrangements for EWS at all levels, particularly the communication and dissemination of early warning where there is current ambiguity. Assist the development of the necessary policy and legislative instruments to enforce the agreed-upon arrangements
- Standardized and institutionalized hazard, risk and vulnerability assessment methods for Georgia
- Nation-wide risk zoning policy based on risk and hazard maps (produced under activity 1.2) will be operationalized through relevant national regulations and guidance documents. Clear communication lines between different agencies will be established, any duplication and inefficiencies will be eliminated. Standard Operational Procedures, Communication Protocols and Codes of Conduct will be developed for each of the agencies responsible for the various elements of the MHEWS and response. Roles of regional and local authorities will be clarified and detailed. SOPs and guidelines for Tbilisi Mayor's office will be developed. Moreover, the Mayor's office will be supported to establish and strengthen a resilience unit there. National operational maintenance procedures for hydrometric network will be established (NEA).
- Techncial Capacity building – Courses in CRM, climate-induced hazard risk management and aspects of MHEWS will be added to the trainings provided by the EIEC to improve the technical capacity and knowledge base for hazard and climate risk management, EWS and long term adaptation planning. Moreover, an internal capacity for EIEC will be built in terms of Training of Trainers (ToT) in above topics. The issues of gender mainstreaming into climate risk management will be integrated into training and capacity building activities. The project will develop training plans for each technical area of expertise related to climate-induced hazard risk assessment and management, and consolidation into an overall capacity development plan. A long-term capacity building plan for Georgia will be developed.
- The GCF project will engage with the multi-stakehlder/multi-sector climate change coordination committee to be formed under the MoEPA in 2018.
- Georgia is a member of The Southeastern Europe Climate Outlook Forum (SEECOF) which was the very first regional climate outlook forum in Europe, started in 2008 at Zagreb, Croatia. The countries participating in SEECOF are: Hungary, Slovenia, Croatia, Serbia, Bosnia, Montenegro, Albania, the Former Yugoslav Republic of Macedonia, Greece, Turkey, Bulgaria, Rumania, Moldova, Israel, Cyprus, Armenia, Georgia and Azerbaijan. Through the GCF project, Georgia will enhance its capacity to participate in the forum, and provide verification of the SEECOF climate outlook. At national level Georgia has an agricultural outlook forum which is will be enhanced by Activity 2.3 below. The GCF project will integrate with and strengthen exsiting regional and national climate outlook forums through the expansion of the observation network and the development of climate products that include seasonal forecasts.

Activity 2.2: Development and implementation of the MHEWS covering all Georgia, building on the Rioni basin prototype and on the expanded hydrometric network to be achieved through activity 1.2.

61. Activity 2.2 will build on the FFEWS which was developed for the Rioni Basin and includes development of the telecommunications system to support the new EWS, and integration of telemetry system for near real time dissemination and use of EWS. The Rioni propotype will be scaled up to the whole of Georgia and extended to other hazards including landslides, avalanches, wind, hail and drought. The key activites will include:

- Development of a fully integrated multi-hazard forecasting system to be implemented within NEA to cover the whole territory of Georgia. The project will address several improvements to the meteorological and hydrological forecasting capabilities of NEA to enable the production of high-quality, high-resolution (grid-size 1km) weather forecasts in Georgia, up to 72h ahead, four times a day, although a lower horizontal resolution (5km) model with a longer time horizon (7 days) will also be run daily. Improvements to meteorological forecasting capabilities will include: i). Model development of Weather Research and Forecasting (WRF); ii) The addition of a new model (COSMO) to the FFEWS platform; iii). The inclusion of additional boundary conditions to the local meteorological forecasting models (ECMWF); iv). A more thorough assessment of the quality of the predictions and the associated work required for the improvement of the predictions, especially at local scale; v) inclusion of satellite precipitation estimates (GPM and MPE) in the EWS; inclusion of double-nesting capabilities enabling both the high-resolution Georgia-domain and the lower resolution Caucasus-domain in the efficient way. The new Numerical Weather Prediction (NWP) system would have the variational data-assimilation (e.g. 3D-Var) capabilities as in the current NEA system. This would include the possibility for generating both background and observation error covariance matrices specific to NEA model domain. Both forecast model and data assimilation codes would support the usage of parallel computing by using standard Message Passing Interface (MPI) and Open Multi-Processing (OpenMP) techniques.
- Inclusion of the data from ground weather radars into the forecasting platform to provide for a finer spatial resolution of the precipitation area, the real-time data availability, and the ability to track approaching storms even before they reach the catchment of interest. Procedures for the inclusion of the radar data will be developed and tested.
- Inclusion of a high resolution Digital Elevation Model (DEM) data from aerial photographs or LiDAR sources; European Centre for Medium-Range Weather Forecasts (ECMWF) data; a new integrated data management system for storage of both real-time and climatological observation needs with real-time quality control procedures; various weather forecast information from global, regional and local models, managed through a weather forecast production system which allows the visualisation and analysis of grid formatted data and observation data including local WRF and COSMO models, the regional ECMWF and HIRLAM or the global GFS; satellite images data, such as EUMETSAT or NOAA satellites; observation data from the different stations deployed; images from the weather radars deployed within the framework of this project;
- Inclusion of a forecast verification system will be implemented, to evaluate the quality of forecasts by objectively measuring how well the forecasts correspond with the actual data as revealed by observations, as part of the quality assurance process of a forecast and warning production environment.
- Development of drought, landslides, avalanches, wind and hailstorm forecasting including design of the forecasting systems, assessment of historical information, product development, development of warning criteria.
- Design and implementation of the “Last-Mile” warning dissemination and communication system
- Development of a link to the socio-economic risk model to be developed in Activity 1.3 to provide Impact-based forecast
- Design and implementation of the National MHEWS Protocol
- Monitoring and evaluation of the designed MHEWS and development of recommendations for the system enhancements, expansion and further development for long-term sustainability of the system

62. In October of 2016, the MIA opened a new Joint Operations Center (a central hub uniting all sub-units of the Ministry, with a 24/7 control room/command centre linked to 112 service. The centre includes a video surveillance system with national coverage, which is used in the monitoring of hazards and dissemination of warnings. MIA is providing co-financing to enhance the surveillance system. The co-financing of the surveillance will include, procurement of services for the fiber-optic network for CCTV/video surveillance in 3,000 locations and operational and maintenance cost of this network. The JOC surveillance system will also be used to verify/validate information from the MHEWS and enhance/compliment the EWS in the situation of short lead time events.

The following diagram shows the key features of the system to be developed.

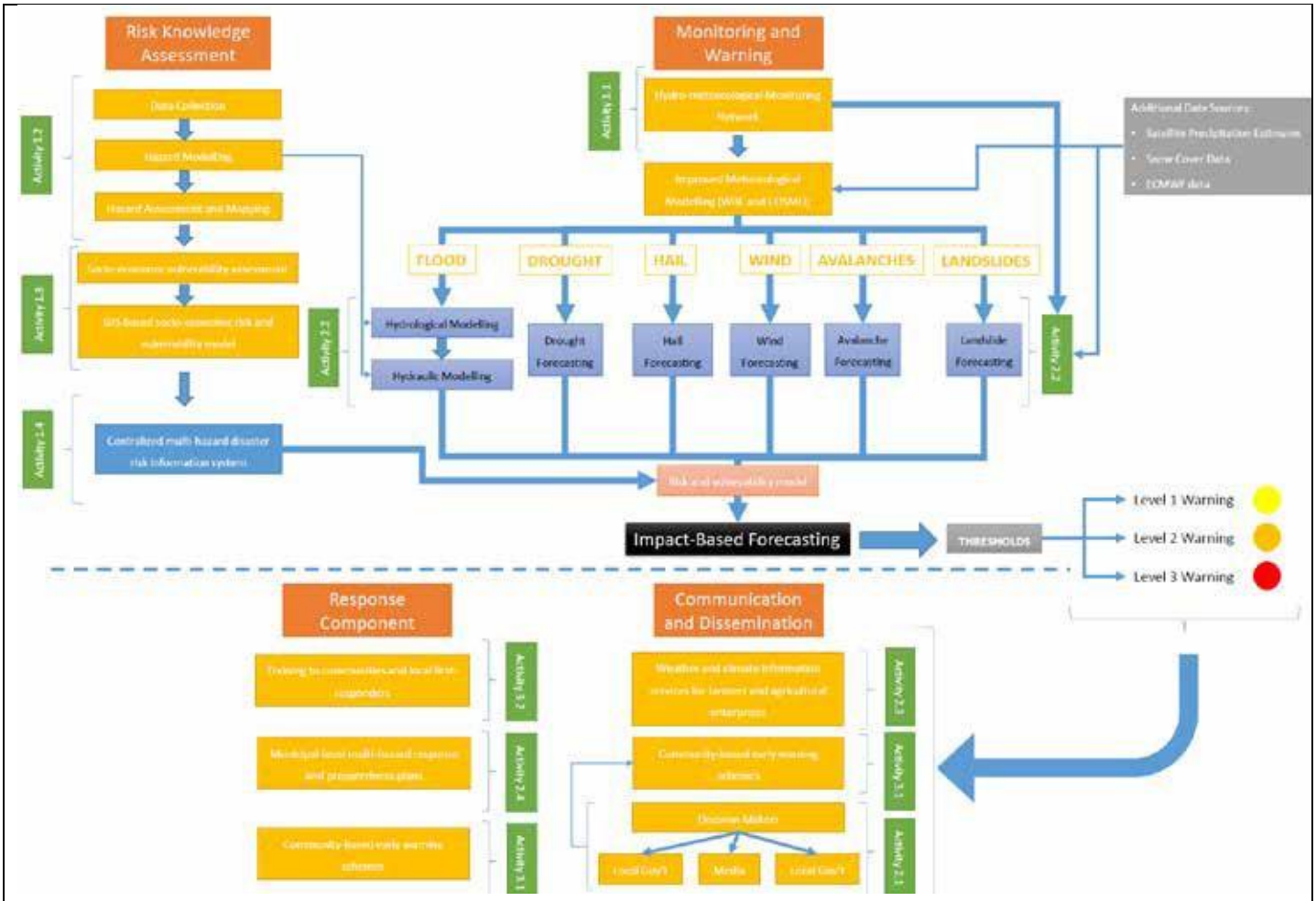

Figure 2: Conceptual component diagram of the impact-based MHEWS

Activity 2.3: Enhancing access and the use of weather and climate information and agrometeorological information services by farmers and agricultural enterprises

63. The activity will build upon the enhanced capacities of the agrometeorological observation network to be achieved through the Output 1, Activity 1.1 and upon FAO's technical support provided to the MoA in climate-smart agriculture and establishing of EWSs for droughts. GCF project will further support capacities of the national agricultural agencies and extension services to generate and deliver tailored climate and weather information and advice to the farmers through the following indicative actions:

- Build upon the enhanced equipment and capacities of the agrometeorological observation network to be achieved through Activity 1.1. and further support capacities of the national agricultural agencies and extension services to generate and deliver tailored climate and weather information and advice to the farmers
- Build capacity within Ministry of Environment Protection and Agriculture in the use of climate information and climate change adaptation for the Scientific Research Centre of Agriculture, National Food Agency and for the municipal Information and Consultations Centres as well as the training of NEA
- Integrate climate risk and adaptation priorities into the agriculture sector plans, investments and budget frameworks, including the investment appraisal skills, economic valuation of climate change impacts, based on sector model, trade off analysis and cost-benefit assessments for a range of plausible adaptation options in agriculture.

- Development of guidance documents, methodologies and technical regulations for the agricultural sector on climate risk assessment and management and the use of climate information
- Development of new climate information products for the agricultural sector (agri-climate maps, calendars, advisories, etc.) and delivery of these products to the farmers to help them make decisions related to timing, such as choosing the best planting dates and deciding when to apply fertiliser.
- Supporting improvement of agrometeorological advisory services (that links forecasts with the direct advice and guidance to farmers as to how to respond to forecasts, what are the most effective response measures etc.) through the NFA, its regional service centrers as well as through the Scientific-Research Center of the MoEPA and its information-consultation centers, altogether providing warning and/or extension services to farmers
- Capacity building and training for local farmers in the use the weather forecasts within their farming methods

64. This activity is aligned with the national agriculture development strategy which includes a strategy for promoting climate-smart agriculture. The national agricultural authorities view enhancing agrometeorological information and services as the key priority for the sector. For example, in the previous years the Ministry of Agriculture supported development of the agri-climate maps accommodating data from 1965 to 2014. The Ministry received major meteorological information from NEA. In the earlier years, there used to be long term weather forecasts, however today only 3-day forecasts are being generated. Longer term (monthly, seasonal) forecasts that are essential for the farmers do not exist. The Ministry started to build a network of agrometeorological monitoring stations and services with the support of the FAO project that provides baseline and lessons for the proposed GCF investment.

65. The Agricultural Extension services system in Georgia is represented by a network of regional/municipal agricultural information and consultations centres present in 59 municipalities. Advice and information to farmers is provided for free. There is experience of delivering information to farmers by SMS. The consultation centres are well positioned to provide climate information and advice on the use of agrometeorological information but capacity building and training will be required. The extension network is guided and informed by the Scientific Research Centre for Agriculture that plays a key role in promoting innovations in the sector. The Centre is responsible for the implementation of national strategy on climatesmart agriculture development. This activity will therefore be fully integrated into existing agricultural climate outlook forums and information dissememation platforms.

Activity 2.4: MHRM planning platforms: development of basin-level multi-hazard risk management plans; municipal-level climate-informed multi-hazard response and preparedness plans

66. The project will work closely with central and municipal authorities and local communities to understand the risks and vulnerabilities (through climate-induced risk mapping and vulnerability surveys mentioned in Outputs 1 and 3), to develop appropriate climate induced hazard management and mitigation measures with the full involvement of the community through Participatory Risk Assessment.

- Develop integrated multi-hazard basin risk management plans for each major river basin (11 in total, including: Enguri, Rioni, Chorokhi-Ajaristskali, Supsa, Natanebi, Khobi, Kintrishi, Khrami-Ktsia, Alazani, Iori, Mtkvari (same as Kura) river basins) with participation of all relevant stakeholders
- Develop Municipal-level climate-induced multi-hazard response and preparedness plans
- Multi-hazard response, preparedeness and resilience plan for the City of Tbilisi . Tbilisi is the capital city where more than one third (around 1.3 million people) of total population is concentrated and a high concentration of critical infrastructure. Capacities of local municipality as well as the preparedness and knowledge of local population is very low as demonstrated during the 2015 multi-hazard events that resulted in human casualties, destruction of critical infrastructure and significant damage to the city as indicated in PDNA report. Thus, by including the City of Tbilisi preparedness planning and capacity building (under Activity 2.1) into the project, GCF will achieve a transformative impact on enhanced resilience of one third of the Georgian population living in the capital and depending on its infrastructure. This activity will be implemented in coordination with the 100 Resilient Cities initiative joined by the Tbilisi municipality.

67. This City of Tbilisi project will be co-funding to the GCF project and will develop the resilience plan for Tbilisi for various areas, including natural hazards (floods) and other natural hazards. The GCF project through municipal planning can help Tbilisi mayor's office by providng technical assiatance on the hazard modelling and mapping (which will be done for all catchments), input to the design of resilience measures, and assist in operationalizing the plan (establishing the resilience unit with the office and building their capacities).

Output 3: Improved community resilience through the implementation of the MHEWS and priority risk reduction measures

68. Through this output the project will secure delivery and use of the early warnings and climate advisories with end-users. Communities' capacity to effectively utilize the EWS information and products and respond to climate-related disasters through planning and implementing structural and non-structural resilience measures will be enhanced. In addition, the project will implement priority structural intervention measures in high risk areas addressing most vulnerable communities (based on sound cost-benefit analysis using the socio-economic risk model) to reduce the risks that the EWS will be designed to address.

Activity 3.1: Implementation of community-based early warning schemes and community-based climate risk management[9] (CBCRM)

69. Community-based EWS and CBCRM schemes will be implemented with at least 100 communities across Georgia based on full community engagement and participation. This project will aim to use gender-responsive participatory methods. The choice of the 100 communities (villages) will be made based on the risk assessment and mapping completed under the Output 1. Communities' willingness to participate and actively engage in the EWS and DRM activities will be one of the key criteria for the final selection of beneficiaries under this activity. There are some key factors that will influence the decision to implement a CBFEWS: i) Frequency of flooding or other extreme events; ii) Community's interest and awareness; iii) Possible lead time; iv) Cost-benefit of the implementation versus flood or other natural hazard damages. Activities will include:

- Community-based EWS and CBDRM schemes will be developed for at least 100 communities across Georgia based on full community engagement and participation which ensure the inclusion of women and vulnerable groups.
- Implementation of Community based EWS where appropriate to complement the fully integrated national EWS. The selected communities will be relatively high risk, have short lead time of the extreme events, have technical constraints for the central system to effectively service the community (e.g. due to remote location or connection problems). Communities will assist in the design, implementation and operation of the CBEWS and will be trained and equipped in monitoring, warning and dissemination, and maintenance of equipment.
- Implementation of Community-based Disaster Management Process. Communities will be engaged through the CBDRM process to identify all notable hazards using gender-sensitive participatory community hazard and vulnerability mapping, the socio-economic impacts and vulnerability of their communities and the risks they have to manage now and in the future. Participatory community-based adaptation interventions will be planned and implemented in priority risk areas to include community disaster risk reduction interventions measures. Communities (particularly women and vulnerable groups) will be trained to implement and maintain non-structural intervention measures necessary to reduce various climate-induced risks. CBDRM measures to be implemented will include community-based agro-foresty on 15 ha of municipal lands.
- Gender mainstreaming will be a key aspect of the CBDRM process to be developed
- NGOs and CBOs with strong grass-roots experience and relevant local partners in natural resource management, women engagement, community mobilization, empowerment, participatory community planning and development and DRR will be engaged to develop and implement this activity
- Impact evaluation of the measures implemented by the project evaluated at baseline, year 4 and year 7 of the project.

[9] Community-based DRM may include but is not limited to e.g. bottom-up community-engagement for mapping of known and perceived hazards and risks, collection and dissemination of current coping strategies and provision of guidance via different means such as videos etc. on best resilience practice; establishment of community-flood (or other hazard)

Activity 3.2: Public awareness and capacity building programme at all levels to effectively deliver climate risk information and training to communities and local first-responders.

70. The public awareness and capacity building of communities and the other users of the MHEWS is a critical component of the successful and effective MHEWS. One of the lessons learnt through the Rioni project is that sustainability of both structural and non-structural risk reduction measures is dependent on the understanding, acceptance and ownership by the local communities. The GCF project will assist the government of Georgia in shifting from *ad hoc* project based awareness and education efforts to a planned, consistent and sustainable national-led information and communication system for enhanced climate and disaster risk management. This activity will be led by the EIEC under the MoEPA who has a mandate as well as experience in environmental outreach, education and capacity building. National and municipal level response trainings for officials will be carried out through cooperation of the EIEC and EMA. Community level awareness raising and informal education activities will be carried out in close cooperation with NGOs having grassroots capacity building and information.

71.The following indicative actions will be carried out under this activity:

Enhance the capacity already built within the EIEC:

- Undertake further capacity building of EIEC to develop their curriculum of training to include of the elements for DRR, CCA and EWS related to all hazards for which they will deliver training under the project and on a long-term basis
- Engage trainers in the form of project experts to embed this necessary training as well as international universities to help develop curriculum and design training courses for EIEC
- Alongside the 'training of trainers' approach described above, the project will help EIEC to develop the training material they will need to deliver the training.

Steps 1-3 will all be done in the first year of the project.

Capacity building at central, municipal and community levels:

- Emergency response trainings for first responders in cooperation with EMA in Strategic
- MHRM planning and MHRM intervention identification approaches
- Development/adaptation of existing guidelines on community DRR/DRM
- Development of MHRM and DRM guidelines for other target groups including teachers, municipal authorities, media, women's groups;
- Capacity building and awareness raising of municipal authorities, local NGOs, CBOs or non-CBO community members in Community-based Risk Assessment approaches,
- Community-based Early Warning Systems and gender-responsive Community-based Multi-Hazard Risk Management;
- Working with the appropriate agencies to establish a training task team to 'train the trainers' and a syllabus for topics such as first aid, search and rescue and warning dissemination, and example standard specifications for external training providers
- Working with the appropriate agencies to develop generic educational material and a 5-year training programme on disaster risk and emergency response for use in School outreach programmes, university courses, communities etc. (training material, Course notes, plays etc.)
- Training on how to use the hazard and risk maps provided (paper and electronic) to raise awareness but also on how to plan development and other activities locally.

Networking and advocacy:

- Organizing annual community forums on MHRM and CBEWSs with participation of target communities and representatives of vulnerable groups to exchange information, lessons learned, successes and impediments; Organizing annual CBO award competitions on advocacy around structural and non-structural measures with a purpose of their inclusion
- into government programmes
- Organizing community-government and public-private dialogues around local risks and risk reduction strategies and their financing.

Youth engagement and training programmes in Multi-hazard risk management (MHRM):

Development of manual for kindergartens and training of kindergarteners in MHRM;

- Development of manual for school teachers on DRR/MHRM;
- Training of school teachers in DRR/MHRM;
- Development of informal education materials for school-based civil or environmental/ecoclubs;
- Training of members of informal civic clubs and/or Eco clubs in MHRM;
- School children/Eco club's students annual award competitions on CBEWS and MHRM;
- Development of educational module on CRM/DRR/MHRM for university students from ecology/biology/geography/social sciences to guarantee implantation of guidelines at university level and growing professionals in climate change and DRR field in cooperation with foreign universities/highly qualified international experts.

National-wide media campaign on gender-responsive MHRM and EWS:

- Using social media to communicate MHRM and EWSconcept to broader society and to disseminate project lessons and successes;
- Organizing TV and radio talk shows around MHRM and EWSs;
- Media coverage of project activities;
- Production of footages, Public Social Announcements (PSAs) of short documentaries around MHRM and GCF project achievement
- Training for media on MHRM and EWS and annual assay/media article awards competitions.

Activity 3.3: Implementation of priority risk reduction interventions that would significantly reduce the risks against which the MHEWS will operate

72. This activity will focus on implementation of priority risk reduction interventions for areas where risk from climate-induced natural hazards is highest[10]. Site specific field assessments by UNDP and NEA of target locations in West and East Georgia where mitigation work could alleviate the effects of flooding and mudslides have also been conducted, followed by outline and preliminary engineering design and preliminary costing. Initially, 21 sites were subjected to conceptual engineering investigation and the broad costs of mitigation work quantified: 9 sites were investigated in West Georgia, largely flood mitigation in the Rioni catchment and 12 sites in Eastern Georgia associated with sediment extraction to mitigate the deleterious effects of mudslides and also flood mitigation. The above has been followed by prioritization of suggested measures applying multiple-criteria analysis, including preliminary Cost-Benefit Analysis (CBA). Investment priority ranking results are summarised in FS Annex 8. The measures were evaluated using a number of social-economic criteria: i) Highest NPV; ii) Highest BCR; iii) Greatest number of properties benefiting; iv) Greatest number of people benefiting; v) Greatest area of agricultural land protected; vi) Combinations of these.

73. As a result, 13 sites have been short-listed for the GCF investment. Based on the outcomes of the preliminary CBA, the technical design and costing of the short-listed structural measures were reconfirmed for these 13 sites through another series of field inspections, consultations with the local and national stakeholders, and technical expert/engineer review. Following the above two-phase prioritization exercise, a social and environmental assessment was conducted for the selected sites/measures, a Social and Environmental Management Framework (SEMF) was developed, the Operational and Maintenance costs were assessed, and the refined CBA prepared for the final list of priority measures. A summary of CBA and prioritization analysis as well as the description of technical design of the measures are provided in the section 3.3 of the feasibility study (for the detailed CBA analysis and outline studies please refer to the feasibility study).

Types of risk reduction measures to be implemented include:

- Construction of embankments (using boulders or gabions)
- River bank protection (wire mesh lining)

[10] Based on August 2016 report "Upscaling of Rioni Flood Damages to all Georgian Flood Plains and an overview of the Impacts on Population, Property and Agriculture within Georgia from Other Hydro meteorological hazards"

- Sediment extraction, removal of debris and vegetation
- Channel widening

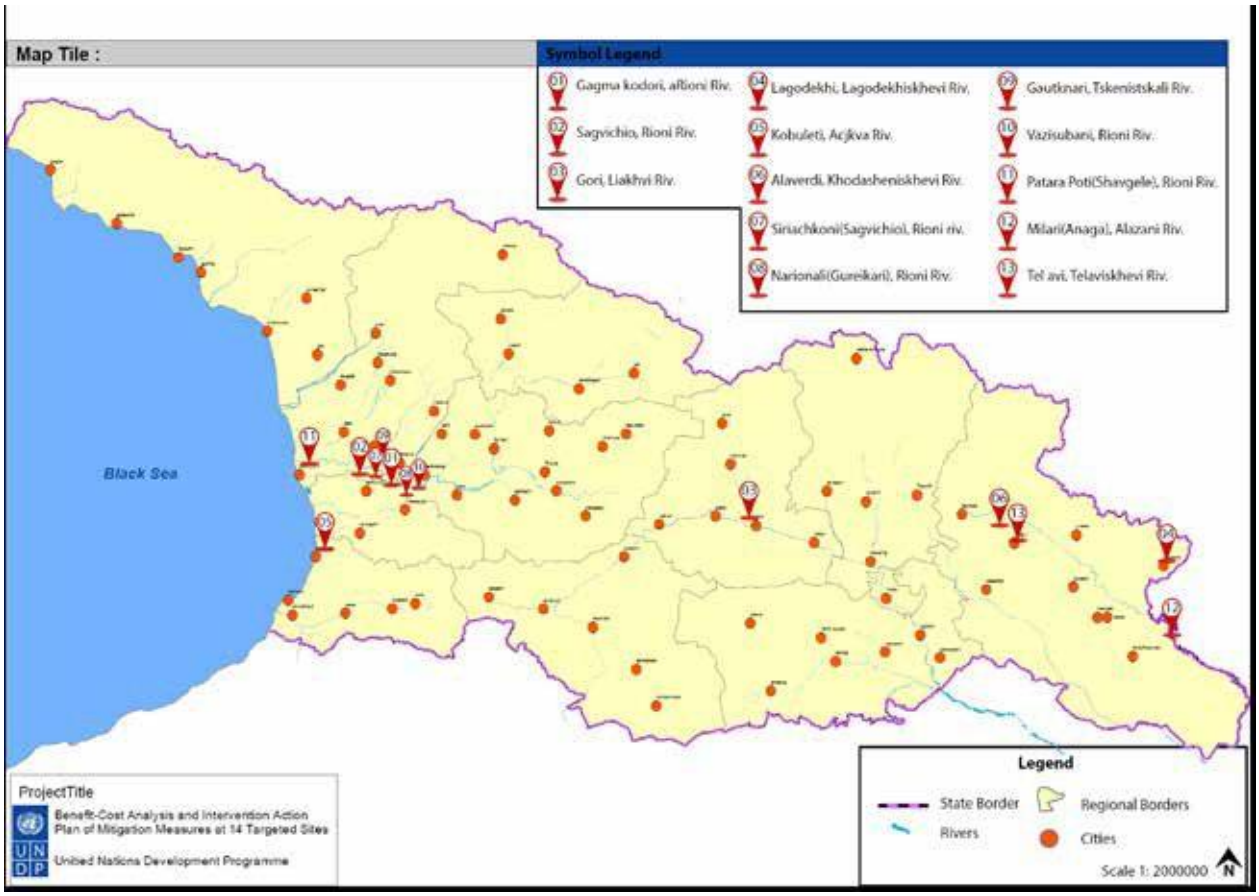

Figure 3: Location of the 13 sites for structural measures

C.4. Background Information on Project / Programme Sponsor (Executing Entity)

74. The ***Ministry of Environment Protection and Agriculture of Georgia (MoEPA)*** has a broad mandate in the field of environment and natural resources monitoring, management and protection that includes monitoring and forecasting of natural and anthropogenic disasters, coordination of planning and implementation of preventive activities, and resilient development of agricultural sector. MoEPA is a responsible body for climate adaptation action planning and coordination at national level. It has a special climate change unit – Climate Change Division under the Integrated Management Department whose head is also a focal point to the UNFCCC. The unit coordinates development of climate-related strategies and national reports required by UNFCCC. The Climate Change Division provides assessments of climate change impacts on the sectors of economy and ecosystems and prepares relevant predictions, develops the national plan for adaptation to climate change, coordinates the national communications to the UNFCCC and provides an inventory of greenhouse gas emissions (GHG). The MoEPA is an NDA for Green Climate Fund.

75.The ***National Environmental Agency (NEA)***, under the MoEPA, is mandated to monitor ongoing hydro-meteorological, geodynamic and geological events, as well as to provide monitoring of environmental pollution, to issue license permits for the exploitation of natural resources, and to ensure the sound functioning of monitoring systems. NEA is the keystone among the agencies of the MoEPA. NEA is responsible for hydrometeorological and geological monitoring, including monitoring of climate induced natural hazards, forecasting, research and analysis. For the purpose of providing input to the National Communications, there are national working groups, representing all related ministries and state agencies, academia, private sector and NGOs. Currently, there is no formal requirement for NEA to be institutionally responsible for climate vulnerability studies, but in the future under the Fourth National Communications it

is intended to strengthen its role as a lead institution in developing CC scenarios and carrying out CC vulnerability studies. Comprising 331 staff members nationwide, NEA is responsible for the preparation of normative and informational documents, forecasts and warning regarding existing and expected hydro-meteorological and geodynamic processes, geoecological conditions of the geological environment and the conditions of environmental pollution; permanent mapping of the territory, risk zoning and forecasting of coastline developments; the management of coast forming processes using engineering activities; the creation of environmental databases, metadata and ensuring its organisational management. NEA is divided into the departments of Hydrometeorology, Geology, Environment Pollution Monitoring, Licensing and Fisheries and Black Sea Monitoring. It also has 4 regional hydrometeorological observatories composed of hydrometric network. MoENRP and NEA have been National Implementing Partners with UNDP for the implementation of the AF-funded US$5 million project "Developing Climate Resilient Flood and Flash Flood Management Practices to Protect Vulnerable Communities of Georgia" (Rioni Project) that serves a baseline and a prototype for the proposed GCF project. The Rioni Project helped build required operational capacities within MENRP/NEA. NEA has been a reliable and responsible partner and fully met its commitment under the Rioni Project to take over the operation and maintenance costs of the new hydrometeorological observation stations installed by UNDP in the Rioni basin.

76. **Environmental Information and Education Centre (EIEC)** under the MoEPA has a mandate in environmental education and capacity building *(http://eiec.gov.ge/Home.aspx?lang=en-US)* and will be responsible for activity 3.2 – public awareness.

C.5. Market Overview (if applicable)

77. The project is developing a multihazard early warning system for Georgia, and the integrated multihazard risk management framework within which this MHEWS will exist. The project will develop climate risk information products which will mainly benefit the population at risk (up to 1.7 Million people) in line with the statutory obligations of the GoG to provide the necessary information to enable them to safeguard their lives, livelihoods and assets from climate induced extreme hydrometeorological risks. This is the responsibility of government and therefore this activity does not lend itself to cost-recovery for these essential statutory services to be provided to the public.

78. By law, NEA is mandated to provide free of charge services to all state agencies, local municipalities, state companies (See table 2 below) and the general public. NEAs commercial customers who pay for services is not large in size and is shrinking, since major customers are greenfield HHPs at their design and construction stage and the number of greenfield projects has been reducing in recent times. Therefore, revenue generatation has a declining trend. Currently no hazard risk data/warning type of info is provided to these customers (only hydromet and climate data).

79. NEA is a 100% revenue generating agency and receives no government financing. Of its total revenues, around 80-90% are generated from royalties on mineral resources. The rest is generated from NEA's commercial/consulting services. A small proportion of those commercial services are for climate services. Overall revenues from climate services is within the range of 300,000-489,000 GEL per year, which is not enough to operate and maintain the existing system.

Table 2: NEA commercial costumer profile and revenues generated for climate services between 2013 and 2017

Types of organizations	Payments in GEL					
	2013	2014	2015	2016	2017	Total
Limited liability and joint-stock state and private companies: developers, construction businesses, insurance companies, energy companies, engineering and design firms, TV and other media companies, etc.	234004.55	271769.42	315046.48	304705.37	273165	1398690.85
State agencies, non-profit organizations under state agencies and local municipalities	20737.25	20389.60	21926.75	7681.1	11649	82383.70
Civic Society Organizations (CSOs)	161.50	320.20	72180	558.9	2158.82	75379.42
Legally registered individual entrepreneurs	6171.80	2194.20	15885.5	7014.65	3153.1	34419.25
Physical persons	51365.05	95067.10	94272.8	55534.2	6638.6	302877.75
Total	312440.15	389740.52	519311.53	375494.22	296764.55	1893750.97

80. The average annual budget of NEA between 2006 and 2015 was approximately 3.74 Million GEL with approximately 70% of total annual budget allocated to hydro-meteorological and geological monitoring, including communications, during that period. From 2014, when NEA became a fully self-financed agency, the annual budget increased to 2.3-2.6 times the annual average values and totalled 8.6 Million GEL in 2014 and approximately 10 Million in 2015. Clearly, with revenues of only 300,000 to 489,000 GEL per year from climate services, NEA is unable to rely on cost recovery from these services to cover the cost of providing these services as well as fulfilling its statutory obligations to state agencies, local municipalities, state companies and the general public. It is clear that the climate services are currently being internally subsidised by the revenues from mineral resources.

81.The GCF project represents an opportuntity to address serious technical capacity limitations of NEA and other agencies in providing its mandated climate risk and EW services to the population at risk and state agencies. The sustainability of the interventions are being addressed through the examination of risk financing approaches to enable government to identify long-term requirements to enable budgeting and planning for the maintenance of the system (See discussion on sustainability below). NEA has no plan to scale up commercial revenue generation as the customer base for this is limited. The examination of financing alternatives is therefore essential.

82. The agrometeorological climate risk products will be tailored to the agricultural climate risk needs and will enhance the climate resilience of the farming sector in Georgia which is comprised mainly of small scale farmers with less then 1ha plots which is mainly used for subsistence farming. The Ministry of Agriculture was providing climate risk information and services through its extension offices for free to farmers. There is a sizable difference between average household and per capita monthly incomes of urban and rural population. More specifically, average rural household monthly income is nearly 20% less than average urban household monthly income and average rural per capita income is 25% less than average urban per capita income. The proportion of population under poverty threshold is 10.1%, poverty rate ($5/day 2005 PPP terms) is 69%. The share of rural population under 60% of median consumption is 20% and that of urban population 15%. The share of rural population under 40% of median consumption is 15% and that of urban population is 10%. The rural population is therefore characterised by poor and vulnerable communities who engage in

farming for subsistence and survival and are therefore unable to pay for climate risk information. At the same time, these rural communities and the agricultutal sector on which they rely, are most vulnerable to climate change. Drought risk under climate change will impact 149,00 ha of land (90% of which is in Kvemo Kartli), while 87,683 ha of land is at risk from hail, 88,035ha at risk from stongd winds. The average annual flood damages to agriculture alone would be 154 Million GEL and 481,007,976 in total damages with 93,284 ha affected.

83. The provision of improved agricultural climate risk services is an imperative for Georgia given the relatively high vulnerability of rural agriculture-dependent communities. Such servies will enable adaptaion to climate change given the improved risk information and changes in farming practices it will catalyse. For example, the project is implementing agroforestry as a means of controlling soil erosion, protection against flooding, landslides and mudflows. Moreover, it will improve ecological and climatic conditions of the soil at the location that renders it more favorable for agricultural practices. The agro-forestry schemes to developed will be for protective purposes and any commercial value derived will not be sufficient and to scale to enable any substantial cost-recovery from this intervention.

84. Furthermore, the project is enabling Georgia to fulfil its obligation to the EU under its association agreement. Two of the EU's, six priorities for rural development through 2020 address economic, social and environmental challenges are:

- Restoring, preserving and enhancing ecosystems related to agriculture and forestry.
- Promoting resource efficiency and supporting the shift towards a low carbon and **climate resilient economy in agriculture**, food and **forestry sectors**

The project is addressing both of these requirements.

Given the public good nature of the project interventions and the lack of capacity of the majority of recipients of climate risk information (i.e. the public at large) to pay for such services, the GCF funds are requested on a grant basis.

C.6. Regulation, Taxation and Insurance (if applicable)

85. All activities of the GCF project, except for activity 3.3 imply implementation of soft, non-structural measures that do not require any government licenses and permits. For hydrometric and other equipment to be procured under the project 1-3-year warranties will be procured from vendors; all new equipment for which insurance products exist in the market will be insured. In the absence of the insurance products for any specialized equipment, alternative options include: prolonged warrantee service from supplier, contingency reserve for force majeure repairs. These cost considerations are taken into account in the budget. The project will analyze and choose optimal locations for the new observation equipment to minimize the risk of damages to the extent possible. Siting of gauging stations will follow international standards which will consider the safety of stations.

86. Flood defence structures that will be constructed/rehabilitated under the activity 3.3 do not require ESIA and environmental impact permitting in accordance with Georgian Environmental Legislation. Concerning construction permits and meeting technical and safety regulations, given the activity will be implemented by the Road Department under the Ministry of Regional Development and Infrastructure (MRDI), the latter will ensure the adherence of all construction activities to national standards as well as to environmental and social management framework developed specifically for GCF project during the feasibility phase.

87. Procurement of goods and services will be carried out in accordance with UNDP and/or national procurement rules and procedures, pending which organization will conduct procurements, UNDP or the implementing partner/responsible party. It will also meet GCF procurement standards. All goods and services procured through UNDP will be VAT-free. National and international experts have to pay income taxes as defined by the Georgian tax code for resident and non-resident persons. The SBAA signed between UNDP and the Government of Georgia serves as a legally binding mechanism as will be the project document that will be developed for this project. Further, under NIM modality UNDP is accountable for the effective and efficient use of resources for the achievement of programme results in conjunction with the implementing partner. This encompasses the design of projects, the assessment of capacities of implementing

partners, the joint selection of implementing partners, and the financing and evaluation of programme activities. UNDP must monitor progress towards intended outputs and appropriate use of resources. Information with links on financial arrangements are detailed in F.4 Financial Arrangements section of the FP. For each NIM project, a project document is formulated, approved and signed by all parties involved. This constitutes the legal framework for the project. In addition to background information, expected outputs, work plan, etc., it includes a clear indication of procedures, a determination of the implementing partner, different roles and responsibilities of all parties involved, a clear definition of actions carried out by the implementing partner, a Peoject budget and corresponding agreed cost recovery. The financial management including auditing of this project will be guided by applicable UNDP financial rules and regulations and guidelines.

https://info.undp.org/global/documents/frm/Financial-Rules-and-Regulations_E.pdf

Within the Rules and Regulations, UNDP's Programme and Operations Policies and Procedures (POPP) outline formal procurement standards and guidelines across each phase of the procurement process, and they apply to all procurements in UNDP, including details of all cash transfer modalities and process under NIM agreements: https://info.undp.org/global/popp/cap/Pages/Introduction.aspx

88. UNDP's currency hedging policy is based on the use of natural hedges (matching cash flows with local non-USD currencies) to the extent possible.

89. The Government of Georgia signed a Standard Basic Assistance Agreement (SBAA) with UNDP on 1 July, 1994. According to Paragraph 7, Article III of the SBAA, the title of ownership on all technical and other equipment, materials, supplies and property financed or provided by UNDP rests upon UNDP until the ownership is transferred to the GoG or the entity nominated by the government.

C.7. Institutional / Implementation Arrangements

90. The project will be implemented following UNDP's National Implementation Modality (NIM), according to the Standard Basic Assistance Agreement between UNDP and the Government of Georgia and the policies and procedures outlined in the UNDP POPP (see https://info.undp.org/global/popp/ppm/Pages/Defining-a-Project.aspx).

91. The national executing entity - also referred to as the National 'Implementing Partner in UNDP terminology - is required to implement the project in compliance with UNDP rules and regulations, policies and procedures, including the NIM Guidelines. These include relevant requirements on fiduciary, procurement, environmental and social safeguards, and other performance standards. In legal terms, this is ensured through the national government's signature of the UNDP Standard Basic Assistance Agreement (SBAA), together with a UNDP project document which will be signed by the Implementing Partner/Executing Entity to govern the use of the funds. The SBAA was signed with the Government of Georgia in 1994.

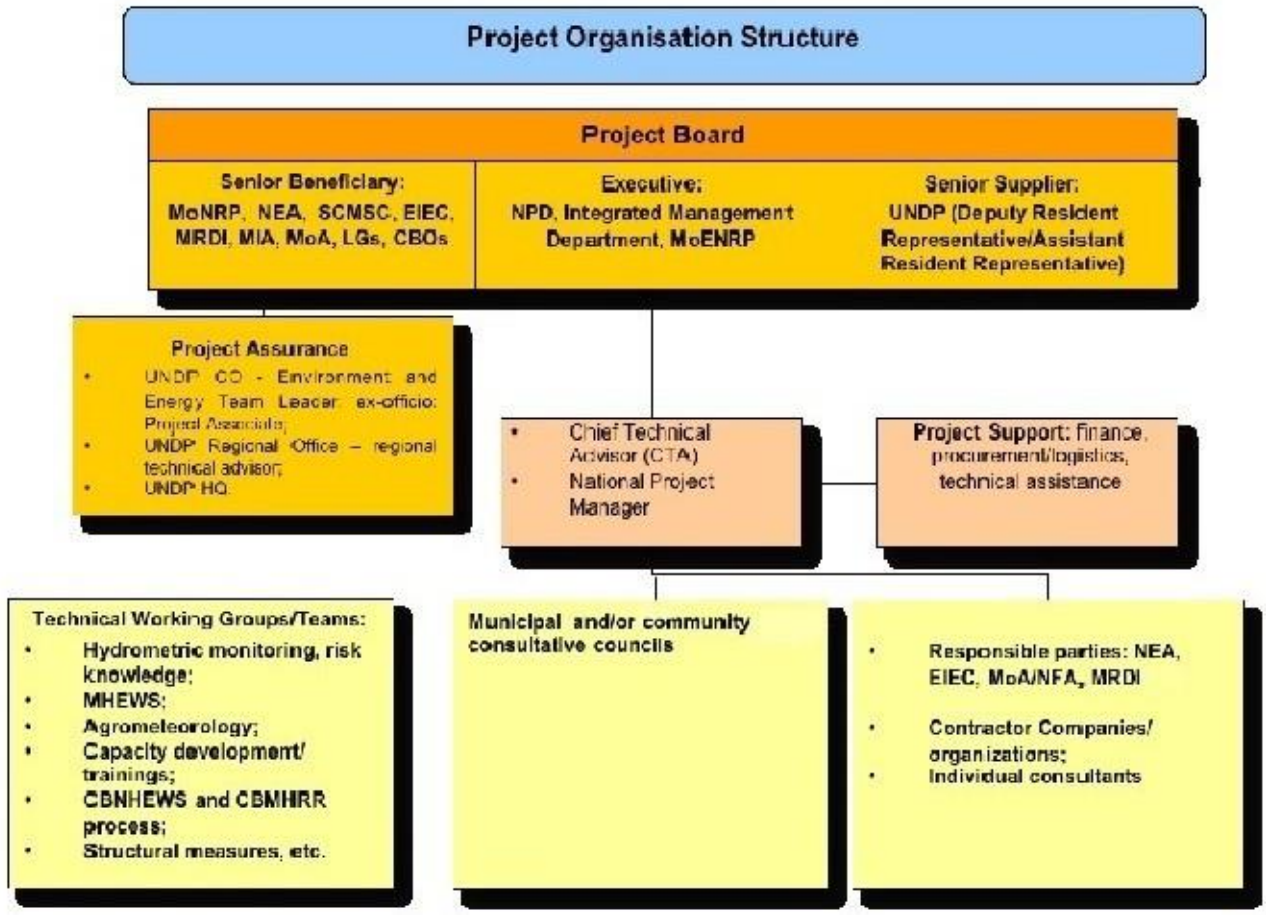

Figure 4. Project organigram

92. The (national) Implementing Partner/Executing Entity for this project is the Ministry of Environment Protection and Agriculture (MoEPA) through its Integrated Management Department, which is accountable to UNDP for managing the project, including the monitoring and evaluation of project interventions, achieving project outcomes, and for the effective use of UNDP resources. As stated in Financial Regulation 27.02 of the UNDP Financial Regulations and Rules, an implementing partner is "the entity to which the Administrator has entrusted the implementation of UNDP assistance specified in a signed project document along with the assumption of full responsibility and accountability for the effective use of UNDP resources and the delivery of outputs, as set forth in such document." By signing a project document an implementing partner enters into an agreement with UNDP to manage the project and achieve the results defined in the relevant documents. The accountability of an implementing partner is to:

- Report, fairly and accurately, on project progress against agreed work plans in accordance with the reporting schedule and formats included in the project agreement;

- Maintain documentation and evidence that describes the proper and prudent use of project resources in conformity to the project agreement and in accordance with applicable regulations and procedures. This documentation will be available on request to project monitors (project assurance role) and designated auditors.

UNDP, in agreement with the GoG, will provide implementation support (support to NIM) as agreed in the Letter of Agreement on Support Services signed between MoEPA on behalf of the GoG and the UNDP. UNDP will also provide

oversight through the Country Office in Georgia, and BPPS/UNDP Global Environmental Finance Unit in Istanbul and HQ.

93. UNDP provides a three – tier oversight and quality assurance role involving UNDP staff in Country Offices and at regional and headquarters levels in line with the requirements outlined in the AMA. This includes management of funds, programme quality assurance, fiduciary risk management, timely delivery of financial and programme reports to GCF and other requirements as per the AMA.The quality assurance role supports the Project Board by carrying out objective and independent project oversight and monitoring functions. This role ensures appropriate project management milestones are completed and reported to the donor. Project Assurance must be independent of the Project Management function; the Project Board cannot delegate any of its quality assurance responsibilities to the Project Manager. The project assurance role is covered by the accredited entity fee provided by the GCF. As an Accredited Entity to the GCF, UNDP is required to deliver GCF-specific oversight and quality assurance services including: (i) Day-to-day oversight supervision, (ii) Oversight of project completion, (iii) Oversight of M&E plan project including reporting. UNDP, in its role as the Accredited Entity, has overall responsibility and oversight for the project including project preparation, project implementation and supervision, financial management and project reporting. UNDP's responsibilities are outlined in the AMA that has been entered into between GCF and UNDP and will also be outlined in the FAA for this project. The FAA and AMA will govern UNDP's responsibilities for GCF. The 'senior supplier' role of UNDP is to represent the interests of the parties, which provide funding and/or technical expertise to the project (designing, developing, facilitating, procuring, implementing) and is covered by the accredited entity fee provided by the GCF. The senior supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project. Furthermore, as the Senior Supplier, UNDP provides quality assurance for the project, ensures adherence to the NIM Guidelines and ensures compliance with GCF and UNDP policies and procedures.

94. In addition, the Government of Georgia may request UNDP to provide direct project services for this project. The UNDP and Government of Georgia acknowledge and agree that those services are not mandatory, and will be provided only upon Government request and specified in the Letter of Agreement on support services. If requested, the direct project services would follow UNDP policies on the recovery of direct project costs relating to GCF funded projects. These services (in the amount of US $0.100 mln under PMC covered by GCF funds) will be specified in the Letter of Agreement. Eligible Direct Project Costs should be calculated on the basis of estimated actual or transaction based costs and should be charged to the direct project costs account codes: "64397- Direct Project Costs – Staff" and "74596-Direct Project Costs – General Operating Expenses (GOE)".

95. The Project Board (PB) will be composed of the representatives of: MoEPA, NEA, EIEC, SCMSC, MRDI, MIA, UNDP and representatives of the local governments and civil society organizations. The Project Board is responsible for making, by consensus, management decisions. Project Board decisions will be made in accordance with standards that shall ensure management for development results, best value for money, fairness, integrity, transparency and effective international competition. The Project Board will meet every six months (or more often if required by PB members).

96. The National Project Director (NPD) will execute the project on a day-to-day basis on behalf of MoEPA within the parameters laid down by the Project Board. NPD will be accountable to PB and will end his/her authority when the final project terminal evaluation report, and other documentation required by the GCF and UNDP, has been completed and submitted to UNDP. NPD is responsible for decision-making for the project. The National Project Director's prime responsibility is to ensure that the project produces results specified in the project document, meet required standard of quality, timeliness and cost criteria. In addition, the NPD will be a liaison between UNDP and the executing/implementing agency as well as will other key Ministries engaged in various components and activities as responsible parties/strategic partners. GCF funds will not be used to pay salaries of government, local government and CSOs' representatives in their Project Board functions, or the salary of the National Project Director (NPD) assigned by the MoEPA or the Informal Technical Advisory Working Groups (TAWG) members.

97. International Chief Technical Advisor will provide regular technical guidance to the project management and technical teams in managerial and technical issues. He/she will be hired for a long-term during the entire project implementation period by UNDP based on UNDP recruitment procedures.

98. Project Manager (PM) will manage the project on a day-to-day basis. He/she will be hired by UNDP based on its national project staff recruitment procedures. The Project Manager's function will end when the final project terminal

evaluation report and other documentation required by the GCF and UNDP has been completed and submitted to UNDP. The Project Manager is responsible for day-to-day management and decision-making for the project. The Project Manager's prime responsibility is to ensure that the project produces and results specified in the project document, meet required standard of quality, timeliness and cost criteria. The annual work plan will be prepared by the PM, will be reviewed and cleared by the Regional Technical Advisor, Global Environmental Finance Unit of UNDP as part of the quality assurance and reviewed and approved by PB through a signature by the NPD. The Project Manager will also be responsible for managing and monitoring the project risks initially identified and will submit new risks to the project board for consideration and decision on possible actions if required and update the status of these risks by maintaining the project risks log according to the NIM Guidelines.

99. Project support will be hired through UNDP and will be composed of finance officer/accountant, administrative assistant, logistics/procurement assistant, driver, project technical assistant and other relevant backstopping staff.

100. While the overall execution/implementation of project will rest upon the MoEPA as an implementing partner, concrete outputs and activities/sub-activities will be implemented by consultant's teams and organizations through open competitions and request for proposals as well as by various government entities as responsible parties, through Letter of Agreements between UNDP and responsible parties. Project implementation and funding flow diagrams are presented on figures 5 and 6 below. More specifically, the project will engage following responsible parties in achieving project outputs:

- NEA – responsible party for the activities related to expansion of the hydrometeorological network, multi-hazard assessment and mapping, establishment of hazard meta-database, development of telecommunications system to support the new EWS and integration of telemetry system for near real-time dissemination and use of EWS, river basin multi-hazard risk reduction plans.
- NFA – responsible party for expansion of agrometeorological network and its integrtion in existing system, enhancing access and the use of weather and climate information and agrometeorological information services by farmers and agricultural enterprises;
- EIEC – responsible party for public awareness and capacity building programme to effectively deliver climate risk information and training to communities and local first-responders;
- Roads Department under the MRDI - Design and implementation of risk reduction intervention structural measures.
- Activities related to the establishment and integration of community-based EWS systems as well as conducting Community-Based Climate Risk Management process will be implemented by a group/consortium of international and local NGOs, having grass-roots experience in the areas of community-level participatory disaster risk planning and management, integrated natural resources management, community mobilization and empowerment, small-grants making. This group/consortium of organizations will be hired by UNDP through open call – Request of Proposal. Technical guidance to and QA/QC of contractor's work will be provided by an international consultant(s) hired by UNDP.

101. Informal Technical Advisory Working Groups (TAWG) will support the CTA and PM. They provide inputs to and endorsement of the design and quality of the project outputs. The TAWGs members will be drawn from government, private sector, academia and civil society to provide guidance and technical advice on the project. A balanced representation of women and men in the TAWGs will be ensured. GCF project Gender Advisor will be a member of all TAWGs to ensure that gender is adequately mainstreamed in all technical discussions. Local stakeholders and community members have a key role in the implementation and monitoring of the project. During the inception phase of the project, the MoEPA working together with UNDP, will consult with all stakeholders, including vulnerable community members, CBOs, and local government, etc. and facilitate an understanding of the roles, functions, and responsibilities within the Project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. Local community consultations councils will be established at target municipality and/or community levels to maintain dialogue with the local beneficiaries and stakeholders throughout the project implementation. The project Logic Framework (indicators, means of verification, assumptions) will be reviewed and the quarterly and annual plans will be refined engaging the communities from the targeted districts. The stakeholders will also be engaged during the mid-term and final evaluations to assess the progress of the project and enable adaptive project management in response to the needs and priorities of the communities.

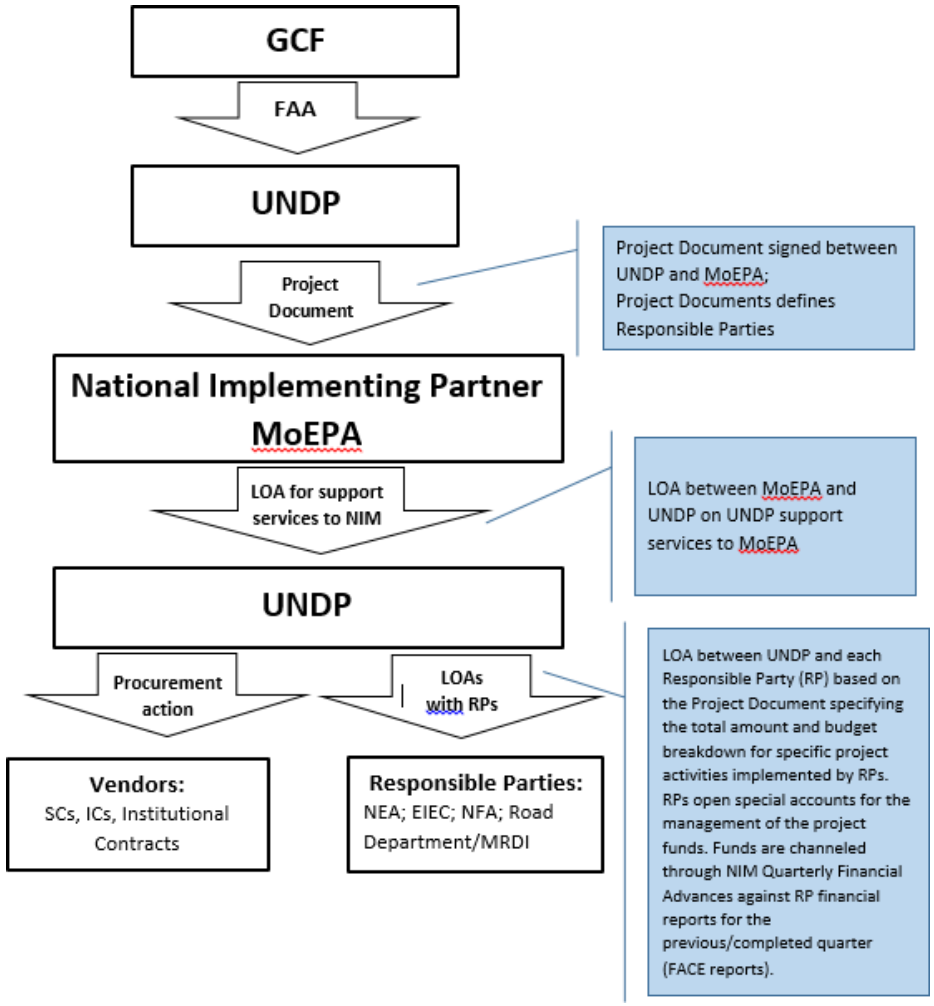

Figure 5. Project implementation diagram

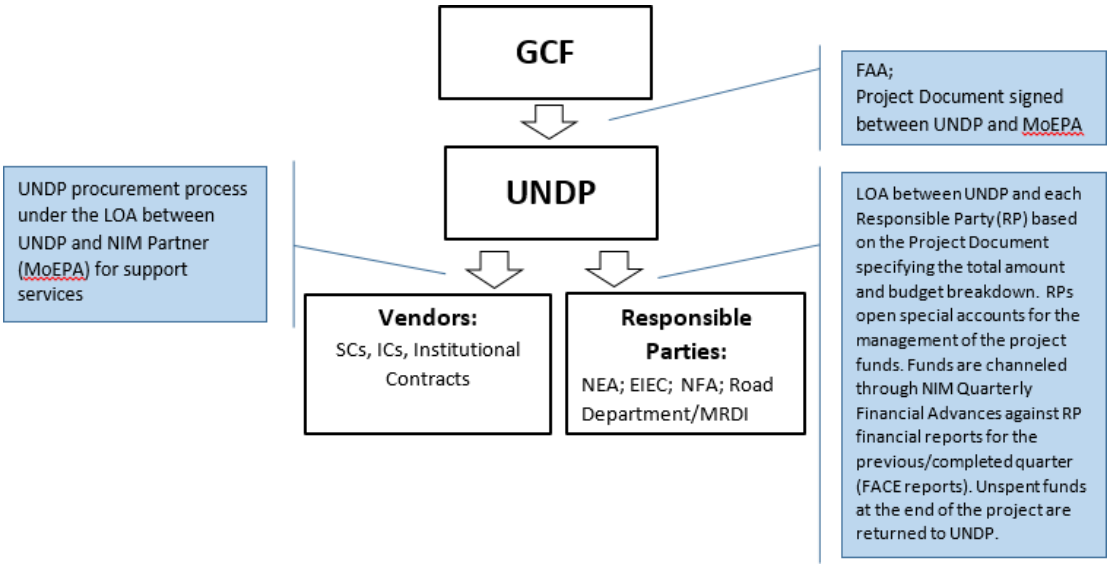

Figure 6. Annotated funding flow diagram

C.8. Timetable of Project/Programme Implementation

102. The implementation schedule with detailed activity progress timeline and output completion is provided in Annex X.

D.1. Value Added for GCF Involvement

103. Georgia's INDC states that without international support the country is unable to deal with negative impacts of the climate change, since estimated economic losses without adaptation measures during 2021-2030 are estimated at about $US 10-12 billion, while adaptation measures cost within 1.5-2 billion USD. The INDC further states that "establishment of early warning systems for climate related extreme events is considered as priority measure by the Government of Georgia… Georgia needs international support for the development and transfer of technologies to increase its adaptive capacity... The implementation of adaptation actions for the period 2021 – 2030 requires the continuous development and strengthening… capacity of communities to reduce their vulnerability to adverse impacts of future climate hazards".

104. Annually, GoG invests significant amount of state funds in post-disaster recovery and disaster risk reduction. Recovery and rehabilitation operations as well as some preventive measures are funded through the reserve funds of the President and the government managed by the Ministry of Finance, budgets of the sectoral ministries and municipal budgets. Funds are primarily spent on the rehabilitation of roads and bridges, water supply systems, energy infrastructure (transmission lines, sub-stations, pipelines, etc.), various buildings as well as on the purchase of houses for ecomigrants and direct compensation of affected population. In accordance with official data, in 2014-2015 68,368,811.43 GEL was spent from the Prime Minister's reserve funds through MRDI Road Department, construction companies, Ajara Autonomous Republic, United Water Supply Company of Georgia and local municipalities. MRDI through its Road Department during the period from 2007 through 2014 spent 46,960,400 GEL on the rehabilitation of road infrastructure, including construction of flood defence structures. Average annual spending by the Road Department is about 5 million GEL. Total amount spent on recovery and rehabilitation works annually is significant, but still is very small compared to GDP and annual average losses.

105. Concerning the financing of EWS/EWS composite elements, e.g. risk knowledge, monitoring, communications and dissemination and, response to climate-induced natural disasters, these activities are financed through annual budgets of NEA, SCMSC and MIA/EMA. More specifically, NEA as a "legal entity of public law" is fully self-financed from its own revenue sources and its average annual budget during last two-three years made up around 8-10.5 million GEL. Of this, around 70% was allocated for hydrometeorological monitoring and forecast. As for other institutions, they are financed through state budget. EMA also a "legal entity of public law", but it is by large is financed from state budget in the amount of 60 million GEL annually. SCMSC's annual budget for 2017 is set at 3.8 million GEL, which is only 73% of 2016 budget and 55 of 2015 budget.

106. Thus, regardless of the government's funding of programmes/activities to compensate losses and protect the population and economic assets, public investments are still insignificant in comparison with annual damages/losses, are largely focussed on post-disaster response and recovery and, are not informed by adequate climate risk knowledge. As a result, the performance of government programmes has been often sub-optimal. The below table summarizes strengths of on-going government programmes and areas where GCF support would provide needed value.

Table 3*:* Synergy of Impacts of Existing Programme Strengths

	Baseline Government Support	GCF Value Added
Government Infrastructure Investments	Rehabilitation of roads, bridges, transmission lines, water supply systems damaged from natural disasters; construction of flood defence systems	Creation of knowledge basis for climate informed investments: hazard and risk assessment and mapping, floodplain zoning and planning, development of multi-hazard risk reduction river basin plans; implementation of climate informed investments; awareness raising.

Community Based Adaptation/ Risk Management	Central and local government rural support and small municipal and rural infrastructure development projects (e.g. rehabilitation of storm-water drainage systems, construction/rehabilitation of flood defence systems, cleaning of agriculture drainage systems, etc). There are no government programs in community-based adaptation/ risk management. Several donors have assisted a number of rural communities in Alazani-Iori and Rioni River basins and in Ajara to enhance the knowledge and the resilience of local communities to climate change and disaster risks	Establishment of CBEWS in at least 100 communities and its integration to EWS, support to multi-hazard Community Risk Management process in 60-100 target communities, including planning and implementation of community resilience measures (e.g. agroforestry, floodplain and watershed restoration, etc.) through community participation and awareness raising.
Climate Risk information and Early Warning	Operations and maintenance of a limited scale hydro meteorological and agrometeorological networks; support to fully-integrated flood EWS system for Rioni River Basin, support to EWS for pest outbreak in Kakheti region, hail warning system; warning and preparedness through EMA of the Ministry of Internal Affair	Expansion, upgrade and full automatization of existing hydromet system to cover 11 major river basins; expansion of agrometeorological monitoring network to cover other CC vulnerable regions (e.g. Shida/Kvemo Kartli), upscale of Rioni flood EWS prototype to national-wide, creation and integration of real-time EWS for other climate-induced natural hazards, development of relevant protocols, SOPs for communications and early warning, building capacities of all relevant government entities in EWS and disaster risk response and preparedness.

107. The GCF involvement is critical to consolidate, scale-up, systematize and institutionalize earlier efforts of the government and donors addressing climate-related disasters. GCF investment into nation-wide climate risk and hazards monitoring and modelling is prerequisite for further Government policy development, risk reduction and risk transfer measures at all levels, and for engagement of all stakeholders including private sector. The existing hydrometeorological observation network in Georgia doesn't provide sufficient and reliable data for risk mapping, modelling and forecasting, due to its limited geographic coverage, outdate equipment, inadequate O/M of the system and lack of funds and capacities to establish and run almost real-time EWSs. Resources, including financial and human resources are not available to expand the floodplain modelling and zoning integrating climate hazard and risk maps for all basins in Georgia and for all climate-induced hazards aligned with international standards. This knowledge of climate risks and hazards, supportive enabling environment and relevant institutional and individual capacities at all central, municipal and community levels to be built by the GCF project are the key missing building blocks for improved public and private financing of DRR, for effective risk reduction and risk transfer mechanisms, and for community-level climate and disaster risk management. In addition, community-based and ecosystem-based approaches to CRM and risk reduction are still not widely known and utilized in Georgia and require external support and systemic approach.

108. GCF involvement is critical because there is a strong evidence of climate change being the underlying factor behind the increasing frequency and severity of extreme climate-related hydrometeorological events, and these events are projected to intensify in the coming decades. Therefore, additional investment is required in generating climate risk information to inform and improve the current government development programmes. Furthermore, the climate related threats also require additional climate finance to increase the scale of climate risk reduction investments to protect vulnerable communities, particularly in remote rural areas - people and their livelihoods. Due to its mandate for enhancing resilience of vulnerable communities to climate change, the GCF is best positioned to reduce/close the

existing financing and knowledge gaps and barriers to improved resilience of Georgia's people to climate induced hazards.

109. The project investment framework consolidates resources from the state budget, bilateral donors and specialized agencies around the core GCF investment. In line with the GCF sustainability principles, this GCF grant would pave the way for private sector engagement into the DRR sector, that has been otherwise stalled, and thus for a greater efficiency of the use of public funds. In the cource of the project development, consulattions have been conducted with representatives of private sector (including large investors and business associations) working in energy and infrastructure, communications, agriculture and insurance sectors. Please see sections on Market Overview (C.5) and Paradigm Shift (E.2.1). All sectors indicated that the new climate information to be generated with the GCF project will potentially create areas of growth and/or opportunities for enhahnced risk management. Please refer to the letter from the Georgian Co-Investment Fund as an example of willingness of the private sector to engage with the project.

D.2. Exit Strategy

110. The project will integrate new hydrometorological and telecommunications equipment and EWSs in existing systems and institutions. These organizations currently have the required capacity to maintain such systems and the project will build additional capacity. For instance, NEA has long-term experience in hydrometeorological monitoring and has various divisions and units to collect, store, process, analyse/interpret data, make forecasts and provide technical maintenance. Moreover, in January-February 2017, as a result of organizational reform, NEA established a special EWS unit, composed of 7 staff members, who will be fully dedicated to EWS operations.

111. Various ministries to be engaged in the process, including MoEPA, and MIA and their specialized agencies (e.g. NEA, EIEC, NFA, etc.) have significant experience in working with international donors particularly with UN agencies, including UNDP. Micro-hact assessments under on-going or recent UNDP programmes as well as a number of Letter of Agreements, certified audits and evaluations are available for a number of key agencies (e.g. NEA, EIEC, MoEPA) to be partnered under the given project indicating that these agencies are capable to implement complex projects with due diligence. For instance, Rioni Flood project has demonstrated that NEA is a trust-worthy partner for UNDP.

112. In terms of maintenance of infrastructure, under suggested project NEA is committed to provide proper O/M to expanded hydrometeorological network and newly created EWS systems during and after the end of the project (please refer to MoENRM's co-funding letter, including co-funding of 20-year O/M of hydrometeorological network (Annex IV)). Furthermore, new agrometeorological stations will be integrated in existing agrometeorological network operated by the NFA under the MoEPA who will also take care of its operations and maintenance after the exist of the project (please refer to MoA's commitment letter in Annex IV).

113. Concerning structural measures, there is already a significant engineering knowledge and experience gained in the country to construct and provide adequate maintenance to flood defence structures. Hence, proper construction and O/M of relevant structures is not an issue. Furthermore, local governments commit themselves to cover O/M costs of engineering structures to be built in their respective municipalities from their local budgets/transfers from central government (Please see co-funding letters from relevant LGs).

114. Concerning non-structural measures to be implemented at the community level, local contribution (either in-kind of cash) will be leveraged from target communities to implement on-the-ground activities and to gain greater ownership from their side. Besides, a significant capacity development and awareness raising programmes will be designed and implemented in target communities that will ensure the institutional sustainability of results to be achieved at community level.

115. The project will help NEA and other relevant authorities design and implement long-term sustainable programs for operations and maintenance of expanded observation system and will assist them to produce climate/weather products that may bring about additional revenues for these agencies (activity 2.1.2).

116. The project will help all relevant authorities develop and implement a comprehensive short to long-term learning and training programs at all levels including community, municipality and state levels as well as for all age groups, including pre-school and school age children, university students, young and senior professionals. All these programmes will be integrated in existing education and training systems and will be regularly applied after the end of the project (activity 2.1.3).

117. The system-level sustainability of institutional capacities created will be ensured by the development and adoption of relevant legal-regulatory and policy/planning frameworks for multi-hazard risk management and early warning systems (activities 2.1, 2.2, 2.3, 2.4).

118. Common support, understanding and effective cooperation of various players will be achieved by establishing a mutli-stakeholder project board and advisory council(s), where issues of various project components will be discussed and solved by the consent of all parties. Furthermore, planning processes at regional, municipal and community levels will apply a participatory approach, where key stakeholders will be engaged from the beginning to the end of each process.

119. The project will address the legal frameworks, policies, governance structures and processes which currently present barriers to sustainable hazard management, DRR, CCA and EWS in Georgia. Through enhancements to the legislative and institutional framework, the project will ensure that the required systems/mechanisms for accountability, transparency, and technical knowledge transfer for DRR, hazard management, CCA and EWS are in place. Importantly, the project will address key institutional arrangement barriers to effective and sustainable multi-hazard EWS.

120. Through the capacity building activities, the technical capacity of institutions will be enhanced and sustainability assured by embedding capacity across all of the relevant institutions. Specifically, in order to ensure sustainability, the project will seek to embed technical capacity in the government Institution for Environmental Information Education Centre (EIEC). This approach to capacity development is far reaching and more likely to ensure sustainability of technical capacity built. As part of the exit strategy, the project will prepare an end-of-project capacity report which will include evidence-based mapped capacity development which will feed directly into the long-term cross-section capacity development plan for GoG to take forward.

121. Overall, the common thread across the project outputs is the integration of enhanced climate risk information and application of best practices in broader planning, thereby ensuring sustainability and introducing a paradigm shift.

122. To ensure that financial and economic resources are available once the GCF assistance ends, the GCF project will provide the tools for government to better identify cost-beneficial risk reduction measures for the long-term management of hazards. This will be based on the cost-benefit analysis tool to be developed under Activity 1.3 which will allow GoG to more effectively plan hazard management and intervention measures, and will assist in annual budgeting and advocacy for funding, for these activities. In addition, the project will assist NEA and other hydrometric equipment owners in developing long-term O&M financial planning to ensure that equipment and systems purchased under the project will be maintained in the long-term. Specifically, the project will provide the following safeguards to financial sustainability:

- Review budgetary requirements for long-term maintenance of optimised hydrometric network and development of a financing model to be put forward to government for the long-term maintenance of networks (using cost-benefit modelling to support the financing model)
- Strengthening cross-agency cooperation in all CRM and DRR areas including DRR financing
- Advise the government on optimum/efficient allocation of funds for DRR
- Improve the donor coordination in the area of DRR
- Strengthen the government capacity to mobilize resources from other sources
- Organizing community-government and public-private dialogues around local risks and risk reduction strategies and their financing.

E.1. Impact Potential

Potential of the project/programme to contribute to the achievement of the Fund's objectives and result areas

E.1.1. Mitigation / adaptation impact potential

123. The project contributes to the achievement of GCF strategic-level impacts through increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions; and increased resilience of infrastructure and the built environment to climate change threats. The project will contribute to the achievement of GCF indicator of the reduction in the number of people affected by climate-related disasters for Georgia's population overall and with the focus on different vulnerable groups (through the application of social vulnerability approach). The project will deliver climate change adaptation benefits through:

124. Improving resilience of about **258,841 households**, **1.71 Million people (0.89 Million women, 0.82 Million men)** (47% of the population) who are at risk from all climate-induced hazards on an **annual** basis, including in the most vulnerable communities in mountainous rural areas as well as densely populated urban areas exposed.

125. Direct impacts of the project on increased resilience and reduced vulnerability as quantified through the economic analysis include:

(i) Present Value of savings of economic assets from expedient use and application of EWS of $58 million over 20 years.
(ii) Reduced losses of lives: the CBA assumes the MHEWS could help reduce loss of life by half the current long term average of 6.25 per year resulting in 62 lives saved and the PVB of $22 million over 20 years.
(iii) 3,500 properties protected through 13 structural measures for the total value of US$ 13 million benefiting 6,500 people.
(iv) Protection of over 3,000 ha of agricultural land through 13 structural flood protection measures for the total value of $6.5 million.

126. Additional indirect impact of the project to be achieved through enhanced climate information and advisories for agricultural sector, improved legal framework and floodplain development zoning, and enhanced adaptation planning. These project deliverables will reduce the risk from all hazards on 325,020 ha of agricultural land currently at risk and reduce the annual agricultural losses from flooding which are currently assessed at US$ 67.8 Million, as well as reduce annual damages from the extreme flood events that are currently assessed at US$ 189.9 Million.

E.1.2. Key impact potential indicator

Provide specific numerical values for the indicators below.

GCF core indicators	*Expected tonnes of carbon dioxide equivalent (t CO_2 eq) to be reduced or avoided (Mitigation only)*	*Annual*	
		Lifetime	
	• *Expected total number of direct and indirect beneficiaries, disaggregated by gender (reduced vulnerability or increased resilience);* • *Number of beneficiaries relative to total population, disaggregated by gender (adaptation only)*	*Total*	Direct beneficiaries: 1.71 million people, 0.89 million women (52%), 0.82 million men (48%) Indirect beneficiaries (including direct): 3.71 Million people (all Georgian population; incl. 1.88 Million women

			and 1.72 Million men) benefit from the enhanced nation-wide EWS and climate-informed planning and risk management through reduced damages to infrastructure, reduced loss of livelihoods and disruption to economic activity, reduced impact on GDP and reduced recovery costs
		Percentage (%)	46% out of 3.71 million total population (2016), 24% of women and 23% of men
Other relevant indicators	***Indicator***: Number and value of physical assets made more resilient to climate variability and change, considering human benefits ***Target:*** protection of over 3,000 ha of agricultural land and 3,500 properties through structural flood protection measures for the total of $19.4 million, with two thirds benefitting property and one-third benefitting agricultural land ***Indicator:*** Total geographic coverage of climate related early warning systems and other risk reduction measures established/ strengthened ***Target:*** By the end of the project, MHEWS established in all major 11 river basins – the entire territory of the country - and necessary institutional/regulatory framework for its smooth and effective operations set; CBEWSs are established in 100 high-risk settlements. Climate-informed multi-hazard risk reduction and management planning frameworks and implementation capacities are in place.		

127. Total number of beneficiaries and reduced annual economic losses under baseline and CC scenarios were calculated during the feasibility study of scaling-up multi-hazard early warning system, based on existing indicative hazard mapping, socio-economics dataset available for all of Georgia (official statistics of the National Statistics Office of Georgia), and by scaling up the GIS-based socio-economic risk model that was developed for the Rioni basin to the rest of Georgia.

128. Digitised data on people, property and agricultural land enabled the enumeration and, in some cases, the quantification of the impact of 7 hydro-meteorological hazards. The analysis considered the Base Line scenario and a Climate Change projection. Findings of GIS-based socio-economic risk mapping (e.g. vulnerable regions, number of population affected, properties damaged and related economic losses) are most widely in line with findings of UNFCCC Second and Third National Communications as well as with findings of other studies, including WB, USAID and EU/RECC climate adaptation studies.

129. The impact potential of the project in these regions will be significant, reducing exposure of largely rural populations. Overall it will contribute to a more resilient Georgia with greater economic stability due to damages averted and livelihoods safeguarded by the proposed interventions.

E.2. Paradigm Shift Potential

Degree to which the proposed activity can catalyze impact beyond a one-off project/programme investment

E.2.1. Potential for scaling up and replication (Provide a numerical multiple and supporting rationale)

130. The GCF project will provide critical climate risk information that would enable the Government of Georgia to implement a number of nation-wide transformative policies for reducing exposure and vulnerability of the population, various sectors (e.g. agriculture, tourism, health and rural development sectors) and critical infrastructure (roads, bridges, electricity transmission lines, other power facilities, water supply and sanitation systems) to climate-induced hazards and private sector engagement. The project will thus catalyse a paradigm shift in the climate-informed national risk reduction and early warning approaches which will catalyse and scale up the use of climate-risk information and approaches across all government sectors. The project interventions are expected the have the following benefits to key sevctors:

- *Critical Infrastructure*: Climate risk information will enable sector resilience planning for all critical infrastructure impacted by climate hazards. With climate risk information embedded into the planning, design, construction and management framework for critical infrastructure, there will be reduced impacts of hazards. Systematic and comprehensive assessment of the risk to infrastructure and development of sector-specific resilience and response planning, will reduce the disruption of essential services resulting from hazards thus increasing efficiency of most sectors of critical infrastructure.
- *Energy*. Currently, the hydropower sector only uses (limited) hydrometeorolgical data in the design and construction phase of their projects. With more data being made available by the project (through expansion of the hydrometric network) and new climate risk products, hydropower companies would have enhanced information base to inform design management and operations of their installations. This could provide improvements in climate resilient design, and efficiencies in management and operations.
- *Insurance*. A weather index-based flood insurance scheme has been developed for the Rioni project. The risk and insurance model are developed but for national coverage and inclusion of other hazard it needs the multihazard and risk modelling that the GCF project will provide. Once this is completed, the insurance sector with the GoG can take this forward. Based on the Rioni project, there is currently a lack of enabling environment for this scheme to be implemented within the lifetime of the GCF project. However, the GCF project through examination of risk financing mechanisms has the potential to address these deficiencies to enable the insurance scheme to be part of the longer-term risk financing solution.
- *Agriculture*. The climate risk products to be developed will provide improved and climate resilient farming practices which will catalyse efficiencies for subsistence farmers and commercial farmers alike.

131. The GCF project will develop basin MHRM plans and will implement some of the structural and non-structural intervention measures in selected high priority areas. These will provide strong replicability impact as they will establish the methods, standards and approaches that will work across Georgia and define these in guidance, legal and policy documents. The potential for scaling up these approaches is therefore significant. A total of 13 priority structural measures have been identified for implementation in 4 out of 11 river basins. There are many other locations where interventions will be need and these will be identified in the MHRM plans. There is therefore at least a threefold replication potential for the structural measures selected assuming there will be at least similar required in the selected basins, plus what would be required in the remaining basins.

132. The GCF investment will significantly improve NEA’s capacities to meet WMO standards. At present, NEA does not meet WMO standards in a number of categories

133. The theory of change for this project is presented on the fig. 7 below

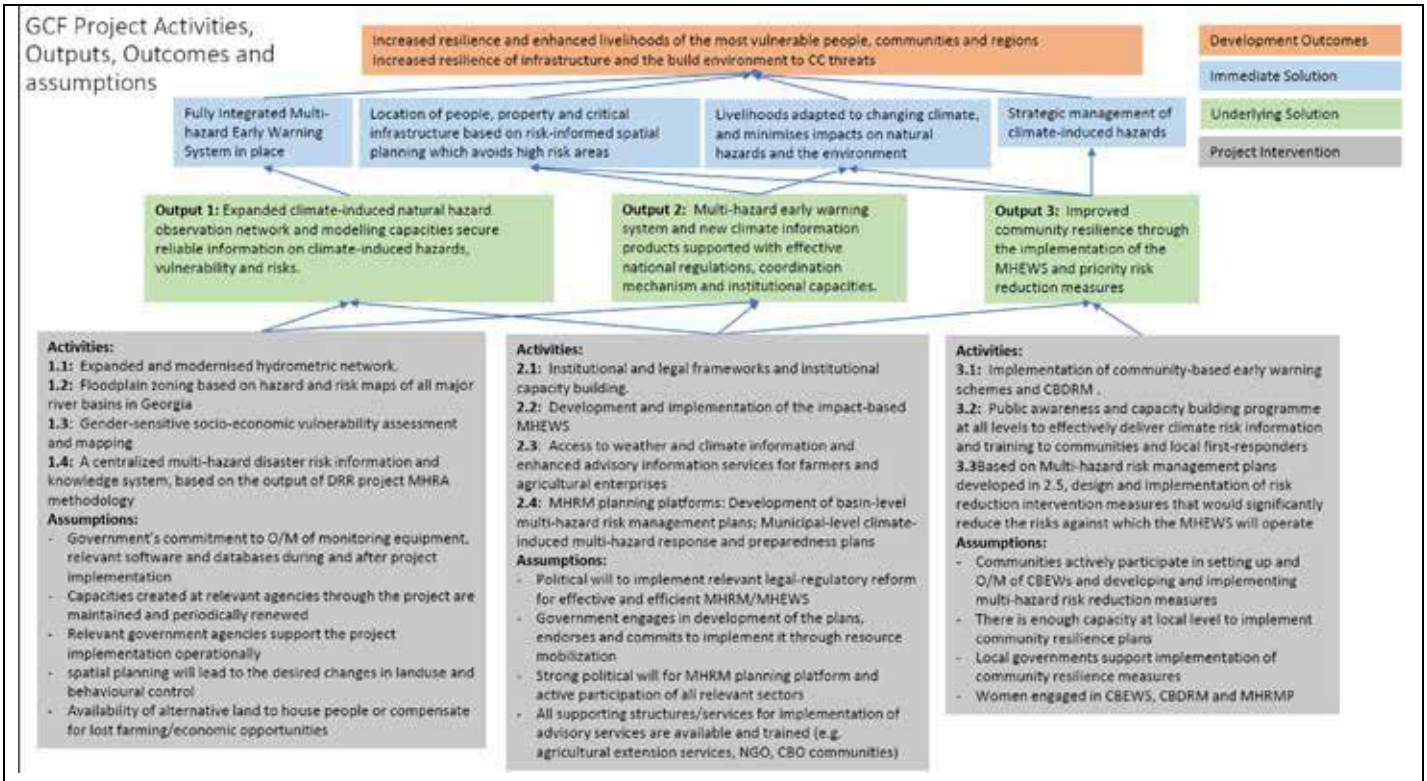

Figure 7. Theory of change diagram

134. The project will up-scaling the Rioni flood prototype EWS to cover the entire country and all climate-induced natural hazards. More specifically, it will expand hydrometeorological monitoring, hazard, vulnerability and risk assessments to 11 major river basins, create multi-hazard and multi-level disaster risk management planning platforms, EWS and relevant capacities central, river basin, municipal and community levels and support implementation of up to 13 priority structural measures to reduce flood and mudflow risks.

E.2.2. Potential for knowledge and learning

135. The project is dedicated to the creation of a comprehensive knowledge basis and the state-of-the-art learning, research, monitoring and forecasting tools for climate-induced hydrometeorological hazards. The project approach to capacity development is to embed capacity within the legal entity responsible for environmental and climate training – the EIEC. This will have a long-lasting and transformative change in the way capacity is built, maintained and developed. Hence, the project will add CRM, climate-induced hazard risk management and aspects of MHEWS sessions to the trainings provided by the EIEC to improve the technical capacity and knowledge base for hazard and climate risk management, FFEWS and long term adaptation planning. Moreover, the internal capacity for EIEC will be built in terms of Training of Trainers (ToT).

136. The project will implement a robust knowledge management system which will be imbedded within the stakeholder organisations and will have the following key aims:

- To ensure access to data and information generated by the project as well as long-term access to data on which their essential institutional functions rely and/or data and information that can be used for evidence for policy and practice advice (connecting **people to information** and knowledge)
- Connect key stakeholder groups, practitioners and experts to ensure that key learning and experience is shared within and across sectors (connecting **people to people**)
- Ensure staff in the stakeholder institutions know about effective and relevant KM techniques so that knowledge is shared, captured and retained by the institutions and shared within and across the sector (**institutional KM improvement**)
- By developing and promoting KM as a tool for continuous and sustainable improvement and ensuring that KM tools generated by the project will be systematically used and maintained within the stakeholder institutions (Developing and **embedding KM tools and practices**).

137. At the community level the project will seek public participation and community support in the design and imlementation of the impact-based MHEWS and all other aspects of the project. Co-design and engagement of communities will be undertaken through activities 2.3 (agro advisories), 2.4. (planning will engage stakeholders) and 3.1 which will be led by grass root organizations\NGOs with communities involved in planning and design/implementation of the CBEWS/CBCRM. A key project sub-activity under hazard and risk mapping (Activity 1.2) is the introduction of methods and tools for systematically collecting damages and losses data at all levels central, municipality and community level to include 'crowd sourcing and public participatory' approaches to reporting damages and impacts of flooding. In addition, these socio-economic survey methods will be conducted alongside the awareness raising and capacity building of communities (activity 3.2) which will enable full participation of communities in the design and implementation phases of all project activities.

138. Learning, awareness raisings and capacity building cut across almost all outputs and activities of the project, but are particularly articulated under activities 2.1, 3.1 and 3.2. These set of measures imply development and implementation of comprehensive multi-hazard risk management and EWS awareness raising, longer-term academic learning and short-term professional training/re-training programs targeting all stakeholders, including vulnerable communities, local governments, kindergartens, secondary and high schools and universities and, relevant authorities.

139. All knowledge products, generated within the project including technical reports, methodological guidelines, regulatory and policy, planning and outreach materials will be available on-line. Meanwhile, all project knowledge products together with other existing documents will be collected and archived on e-library on multi-hazard disaster risk management.

140. Altogether, the project will create solid grounds for better understanding of current and future trends of climate-induced natural disasters as well as for improved preparedness and resilience to these events.

E.2.3. Contribution to the creation of an enabling environment

141. The project will create an enabling environment at central, municipal and community level through improved access to climate information and through an enhanced systems and institutional capacity to use the information, tools and technology.

142. The project will establish almost real-time fully-integrated multi-hazard early warning system and risk knowledge basis across the country, using state-of-the-art hydrometeorological and agrometeorological monitoring, field assessment/survey (geomonitoring, etc.), modelling (hydrological and hydraulic models, DEM, etc.), forecasting (meteorological forecasting, use of ground weather radar, satellite imagery and aerial photography), EWS (Delft-EWS), telecommunications (GMS, internet, SMS, CCTV, TV and radio, walkie talkies, etc.) and information (GIS, web-based information portal and meta-databases, etc.) technologies. It will also create new climate and weather products (e.g. climate advisories) for various users, including sectoral ministries, private investors, media, population and farmers. Participatory “Last Mile” communication solutions tailored to the needs of local communities, including CBEWSs and demonstration of cost-effective risk reduction and community resilience measures through such approaches as watershed/floodplain restoration, agroforestry, and combination of structural and non-structural protection measures are also pretty much a novelty for the country. Furthermore, the project will combine best available science and local knowledge for vulnerability assessment, hazard and risk mapping and will introduce multi-hazard risk management planning processes at river basin and community levels. To enable an effective use of this data, information and tools, the project will develop National MHEWS Protocol, enhance interagency coordination and communication, operationalize climate-resilient planning at basin level and at the level of municipalities, and upgrade institutional capacities, SOPs and information management systems within key institutions, (e.g. JOC/MIA, municiplaities including Tbilisi, etc.). A comprehensive training programme will be implemented for professionals and practitioners of key government institutions. The project will measure the change in institutional capacities of the key agencies for integrated risk management. – Activities 2.1, 2.2, 2.4.

143. The project is creating three main categories of enabling conditions for climate resilience of the most vulnerable communities and their assets. First, under Activity 1.1 the hydrometric moniroting network will be significantly enhanced, providing enabling technologies and conditions for monitoring, forecasting and managing hydrometeorological hazards. Under Activity 1.2 innovative tools and methods will be introduced for hazard, risk and vulnerability assessment, modelling and mapping and will provide definitive hazard maps for key hazards for Georgia. Under Activity 1.3, cost-benefit analysis methods and tools will be introduced to embed climate-risk informed, appraisal-led methods of strategic planning for disaster risk management and climate change adaptation. Under Activity 2.1 the project will strengthen the legislative framework and build capacity in key institutions which will signifificantly enhance the enabling environment for MHEWS. The GCF project will implement and build upon the key recommendations of the DRR strengthening project and the Rioni project to enhance the capacity to use EWS information for both the public and private sector. The following specific actions will be implemented with the GCF support:

- Policy, regulatory framework and technical guidance for MHEWS and climate risk management
- Institutional strengthening, coordination, communication and enhanced use of climate information.
- Training and capacity building of relevant stakeholders at all levels.

The specific activities are detailed in E2.4 below.

E.2.4. Contribution to regulatory framework and policies

144. The project will create a legal-regulatory basis for mutli-hazard risk assessment (MHRA) and vulnerability assessment and multi-hazard EWSs, including protocols and SOPs for data collection, processing, analysis, forecasting, communications and dissemination. More specifically:

1. Flood risk management regulatory framework will be strengthened by supporting integrating climate induced flood and droughts risks management into water legislation by adaptation of #24 EU Water Framework Directive CIS guidance document on River Basin Management under Changing Climate
2. Translation, adaptation and adoption of the Guidance for Reporting under the Floods Directive (2007/60/EC)
3. Technical regulations and guidance on EWS will be developed and their adoption facilitated;
4. MHRA mandates and methodology will be finalized; MHRA technical regulation will developed and its adoption facilitated;
5. Technical regulations on vulnerability assessment and CBA methods will be developed and their adoption facilitated;
6. Nation-wide floodplain zoning policy based on risk and hazard maps will be operationalized through relevant national regulations and guidance documents;
7. Standard Operational Procedures, Communication Protocols and Codes of Conduct will be developed for each of the agencies responsible for the various elements of the MHEWS and response;
8. Roles of regional and local authorities will be clarified and detailed. SOPs and guidelines for Tbilisi Mayor's office will be developed;
9. National operational maintenance procedures for hydrometric network will be established (NEA);
10. Community warden systems will be elaborated and integrated into national response system.

145. In addition, MHRM planning frameworks will be developed at river basin, municipal and community levels. More specifically:

1. MHRM plans will be developed for 11 major river basins;
2. Multi-hazard response and preparedness plans will be development for those municipalities where structural measures will be implemented (around 10 municipalities) as well as for Tbilisi;
3. Community resilience, response and preparedness plans will be developed for 100 target communities

E.3. Sustainable Development Potential

Wider benefits and priorities

E.3.1. Environmental, social and economic co-benefits, including gender-sensitive development impact

Socio-economic benefits, including livelihoods and income generation

146. During the project implementation phase, at least 100 rural communities and particularly, those living in remote mountainous areas will directly benefit from the activities. Specifically, while implementing priority structural and non-structural interventions (agroforestry, floodplain and watershed restoration, etc.), temporary jobs will be created for locals, including women and in particular, the most vulnerable groups of women (e.g. single mothers, mothers with many children, etc.) by engaging them in on-the-ground activities. The afforestation measures could have significant economic effect to local communities, in case of high economic value plant species (e.g. walnuts, almonds, etc.) are used.

147. The project will directly result in the safeguarding of livelihoods and income generation, due to the activities which will directly reduce exposure to hazards and provide early warning of impending disasters, thus reducing damages and losses, improving food production (through protection of agricultural land from hazards). This will have direct and indirect livelihood stabilization/protection and potentially income generation benefits. The project will develop the socio-economic baseline information on all communities and their livelihoods at the household level, and will link this information to the calculation of current climate induced risks by integrating hazard and socio-economic data on livelihoods, health, access to public services, etc. Thus, ensuring that interventions are climate-informed and take account of current and future socio-economic factors.

148. Multi-hazard early warning systems including improved advisory agricultural bulletins will vastly improve productivity of agricultural systems and will protect other economic activities currently at risk from the major hazards. In addition, municipal preparedeness and response plans will safeguard key infrastructure, which enables economic activities to recover from, and continue during disasters. Structural and non-structural measures will provide direct protection from loss and damages to people and property in highest risk areas.

149. The project has the potential to bring about long-term social and economic benefits in terms of avoided human and economic losses particularly, losses in agriculture sector, considered as one of the most vulnerable strategic sectors to climate change. The project will design and implement community impact evaluation surveys to monitor and measure change in the communities directly and indirectly targeted by the project.

Gender benefits

150. Gender mainstreaming will be a key aspect of the GCF project and in particular of the CBCRM process to be developed. In engaging with the communities, the project will pay particular attention to inclusion of vulnerable groups and particularly women to ensure that gender issues are taken into account. As outlined in the Gender Assessment and Gender Action Plan (Annex XIIIc), there are considerable differences in vulnerability to disasters between the genders in Georgia, in line with traditional gender roles. Men are 25% more likely than women to be employed, self-employed or engaged in contract work. In general, male-headed households have higher incomes than female-headed households and overall there is a considerable difference in the income of male-headed households, which emphasises the increased vulnerability of female-headed households. Pregnant and nursing mothers are particularly vulnerable because of their increased need for food and water and their decreased mobility. As the primary caretakers of their homes, women attend to the needs of children, elderly and the disabled. This increases their workload and reduces their mobility in cases where quick evacuations are required or where they live a long distance to water supply facilities. For effective climate and disaster risk management, the project will ensure that women are primary stakeholders and will therefore need to be involved in decisions on the types of solutions that are implemented. Gender mainstreaming actions, capacity building and tools will be applied at various institutional levels (central government agencies, local government, community level), in particular, through the Activities 2.1, 2.2, 2.3, 2.4, 3.1 and 3.2. Gender differentiated indicators will be used to monitor the projects performance in achieving the right gender balance. Please refer to the Gender Action Plan (Annex XIIIc) for the description of gender mainstreaming actions to be supported through the project.

Environmental benefits

151. The project will increase the resilience of vulnerable people, properties, infrastructure and economic sectors. Further the project will enhance the resilience of forest ecosystems, including protected areas and land resources as well as will protect streams and lakes from siltation and thus, aquatic fauna from increased turbidity. The project is addressing climate risks by introducing CRM and CCA measures. In general, the project is providing key environmental protection benefits through the introduction of disaster risk reduction, climate change adaptation and protection of people, property and the environment from major hazards. Specific environmental benefits include, improved eco system functions through better spatial planning and the introduction of agro-foresty which will improve the natural functions of the floodplains and watersheds within which they are implemented. Other environmental benefits include reduction in soil erosion and land degradation through the zoning of activities away from high risk areas asa well as improved management. Improved agricultural practices that the project will catalyse, will also provide environmental enhancements. In the long-run the project will bring about significant environmental benefits by increasing the country's resilience to climate-induced natural disasters and thus, enabling its population to better protect national assets, including environmental assets (land, forest and land resources).

E.4. Needs of the Recipient

Vulnerability and financing needs of the beneficiary country and population

E.4.1. Vulnerability of country and beneficiary groups (Adaptation only)

152. As described above, the majority of victims from climate-induced natural hazards and eco-migrants come from economically disadvantaged highland areas, where people are mostly self-employed, running small-scale subsistence agriculture, heavily depending on local natural resource base and earning extremely low/no income. They are also disadvantaged in terms of access to roads, critical infrastructure, telecommunications systems and basic social services. Therefore, coping capacities of remote (mountainous) rural communities are limited. Meanwhile, the majority of economic losses are attributed to densely populated urban areas regardless of higher social-economic opportunities as well as better access to critical infrastructure, basic social services by urban population. However, high concentration of people and infrastructure in urban areas makes inhabitants of densely populated areas (e.g. Tbilisi) extremely vulnerable. Rural communities, both upstream and downstream suffer significantly from agricultural losses due to climate-induced natural hazards that aggravated already existing rural poverty and vulnerability.

153. SNC, TNC and the vulnerability analysis conducted as part of the feasibility study of this GCF project indicate that hydro-meteorological hazards are intensifying over time, and increasing in spatial distribution. These spatio-temporal changes in hazards will together negatively impact communities in Georgia including socio-economic impacts. The predicted higher precipitation in Western Georgia will impact on soil erosion leading to aggravation of mudflows and landslides, with a deleterious effect on farming and the abandonment of settlements and infrastructure, and increased economic losses due to flooding. Whilst in Eastern Georgia increased temperatures and stronger winds will lead to an increase in droughts, severe hail storms and soil degradation which in turn will significantly affect the yields of the important crops. Crop yields are already reduced post the Soviet era through the fracturing of central land management policies and insufficient application of fertilizer through the lack of will or finances. Increases in precipitation and temperature will lead to further reductions compounded by lack of disease resistance, endemic to some crops, especially vines which are old and less resilient to a changing climate.

154. The regions at greatest exposure to each hazard both now and potentially into the future are highlighted in the table below.

SUMMARY FOR HIGHEST RISK ZONES	Percent Population affected		Percentage properties Affected						Percentage in Georgia					
Region	*Floods*		*Drought*		*Hail*		*Wind*		*Avalanche*		*Landslide*		*Mudflow*	
	Base line	*Climate Change*	*Base line*	*Climate Change*	*Base line*	*Climate Change*	*Base line*	*Climate Change*	*Base line*	*Climate Change*	*Base line*	*Climate Change*	*Base line*	*Climate Change*
Achara	1.4	6.2	0.0	0.0	0.00	0.0	0.0	0.0	0.000	0.98	12.7			
Guria	0.9	2.0	0.0	0.0	0.00	0.0	0.0	0.0	0.000	0.18	7.0			
Imereti	1.9	3.4	0.0	0.0	0.00	0.0	0.0	23.9	0.000	0.00	28.6			
Kakheti	0.2	0.4	0.1	0.4	0.06	0.4	0.0	0.3	0.000	0.00	3.0			
Mtskheta-Mtianeti	1.0	1.8	0.0	0.0	1.80	0.0	6.3	8.3	0.035	2.26	10.7			
Kvemo Kartli	1.0	2.0	58.4	72.5	6.32	16.2	0.0	1.4	0.000	0.00	5.0			
Racha-Lechkhum-Kvemo Svaneti	3.7	5.3	0.0	0.0	4.14	12.2	12.7	36.7	0.007	0.42	10.5			
Samtskhe-Javakheti	2.5	3.7	0.0	0.0	0.00	51.1	0.0	0.0	0.000	0.28	6.9			
Samegrelo-Zemo Svaneti	3.0	10.1	0.0	0.0	0.00	0.0	3.5	4.0	0.001	0.15	11.2			
Shida Kartli	1.4	2.8	0.0	0.0	0.00	0.0	0.0	0.0	0.000	0.00	4.4			
Tbilisi	0.5	0.8	1.9	48.6	0.00	0.0	0.0	0.0	0.000	0.00	0.0			
GEORGIA	**1.2**	**3.0**	**7.3**	**22.8**	**1.30**	**5.4**	**1.1**	**6.5**	**0.002**	**0.22**				

- Currently Racha-Lechkhumi-Kvemo-Svaneti is the region with the greatest population at high **flood** risk but Samegrelo-Zemo Svaneti will overtake under climate change with over 10% of the region's population in high risk flood zones. Racha-Lechkhumi-Kvemo-Svaneti also has the highest exposure of property to **strong winds** and the number of properties exposed may treble in the future.
- Kvemo Kartli is overwhelmingly the region most exposed to **drought** both now and into the future with 58% of properties potentially exposed. Kvemo Kartli has over 6% of its population exposed to risk from extreme **hail** events at present. Though this is expected to increase into the future some 51% of properties in Samtskhe-Javakheti may become exposed to extreme hail risk.
- More properties in Mtskheta-Mtianeti are exposed to **avalanches** than any other region.

- The highest number of **landslides** are in Imereti.
- Northern Kakheti and Mtskheta-Mtianeti are most sensitive to **mudflows.**

E.4.2. Financial, economic, social and institutional needs

155. Despite the last decades' significant socio-economic transformation, Georgia is still a country in transition with around 2.7-2.9% annual GDP growth rate (2015 and 2016 official statistics), high internal and external indebtedness, negative export-import balance, 13% unemployment and particularly, high youth unemployment (26%), significant disparity between standard of living and incomes of rural and urban population and rural poverty, related to land fragmentation, soil degradation, low access to local capital and foreign markets, prevalence of subsistence and small-scale farming, outdated infrastructure, low capitalization and mechanization of agriculture sector, shortage of inputs and farmers' poor knowledge on good agricultural practices, etc. Moreover, in recent years due to various external shocks, the country's economic performance is worsening. Given this factor, the government was urged to curb its 2017 budget by 10%. Thus, Georgia is not currently in a position to fully deal with climate change and disaster risks. If conservatively, this socio-economic trend is maintained in the future, under predicted climate change scenario, existing financial gap between CRM investments and the needs will further increase. Thus, the country requires external financing to reduce current and projected climate-induced natural disaster risks.

156. Georgia lacks financial resources, knowledge and capacities at all system, institutional and individual levels to conduct multi-hazard, vulnerability and risk assessments, establish real-time monitoring, forecasting and early warning systems in order to make climate-informed decisions and implement climate-induced disaster risk management measures. Moreover, there is significant financial gap between actual and required DRR and CC adaptation investments. Both rural and urban population and the government have low response and preparedness capacities. All these needs are articulated in SNCs, TNCs and INDCs as well as in various DRR related policy documents and assessments.

E.5. Country Ownership

Beneficiary country (ies) ownership of, and capacity to implement, a funded project or programme

E.5.1. Existence of a national climate strategy and coherence with existing plans and policies, including NAMAs, NAPAs and NAPs

157. The project's long-term goal, immediate objectives and expected outcomes as well as planned activities are in line with priorities of INDC, National DRR Strategy and Action Plan, draft concept paper/strategy on EWS, being developed under the leadership of the Ministry of Interior and, draft national adaptation plan for agriculture sector, also being developed under the leadership of MoEPA through its Environmental Information and Education Centre (EIEC). Georgia's INDC (2015) clearly identifies the problem of intensifying climate-induced extreme events as a priority for the adaptation action. The INDC specifically states that the "establishment of Early Warning Systems for climate related extreme events is considered as priority measure by the Government of Georgia" in the area of adaptation to climate change. The National Plan of Action for Capacity Development for Disaster Risk Reduction (2015-2019) also clearly reflects climate vulnerability and climate change as underlying risk factors and the needs for climate change adaptation actions. The National Plan envisages development of: (i) Unified methodology and tools for multi-hazard risk assessment, mapping and monitoring; (ii) Centralized multi-hazard disaster risk information and knowledge system, consisting of national e-Library, databases, information systems and knowledge portal; (iii) Local-level detailed hazard mapping and risk assessment; and (iv) Early Warning Systems, national and local, by hazard and sectors; and end-to-end multi-hazard nation-wide integrated early warning system.

E.5.2. Capacity of accredited entities and executing entities to deliver

158. UNDP globally has an excellent track record and experience in implementing climate adaptation and disaster risk reduction programmes and projects as well as highly competent technical team at HQs and regional offices. Over years, UNDP CO in Georgia with support of technical advisors of BCPR and UNDP RBEC has been engaged in preparing national communications to UNFCCC, creating methodological frameworks for NHDRA, establishing a Hyogo platform and multi-stakeholder thinktank on DRR, conducting various DRR and post-disaster assessments, including Tbilisi PDNA and CADRI assessment and, implementing community-based natural resource management and climate adaptation measures through GEF Small Grant's Facility. More importantly, it has recently finished a prototype Rioni Flood Project, funded through Adaptation Fund in cooperation with NEA and MRDI that created almost real-time fully-integrated flood EWS and necessary capacities for real-time hydrometeorological monitoring, hazard assessment, modeling and forecasting for Rioni Basin as well as enhanced resilience of a number of vulnerable communities within the pilot basin through supporting implementation of flood defense and resilience structural and non-structural measures. This prototype project will serve as a basis for up-scaling under this GCF project. UNDP CO in Georgia has also a track record of implementing large-scale (US$ 5- 20 million budget projects) projects, with both soft and hard assistance components.

159. The proposed project is aligned with UNDP's comparative advantage in the areas of capacity building, providing technical and policy support, reducing barriers and creating enabling conditions for adaptation planning and investments. It also builds on UNDP's EWS and climate information projects in 75 countries with 67 EWS established globally with UNDP support funded through The Adaptation Fund, Global Environment Facility Trust Fund, Least Developed Countries Fund, Special Climate Change Fund, Canadian International Development Agency, and other partners.

160. The MoEPa has been a long-term partner for UNDP in Georgia in implementing GEF-funded medium to large-size projects, including climate change mitigation and adaptation, water resources management and forestry projects. Moreover, NEA was an implementing partner for UNDP under Rioni AF Flood project and proved to be a reliable counterpart as outlined in terminal project evaluation (See Annex VIII for terminal project evaluation report). Another Agency of the MoEPA that currently implements a UNDP/GEF project aiming at creating Knowledge Management System for implementation of 3 Rio conventions is Environmental Information and Education Centre, which will also be engaged in GCF project as responsible party for public awareness and capacity building activity.

161. UNDP CO has also past and current track record of successful cooperation with the MoA, through its economic development and governance portfolios as well as with MRDI and MIA/EMA in the areas of DRM/DRR and CC adaptation.

E.5.3. Engagement with NDAs, civil society organizations and other relevant stakeholders

162. This project proposal together with feasibility study was designed in close cooperation with the First Deputy Environment Minister, who is also a NDA and, representatives of Integrated Management (Climate Change and Water Resources Management Divisions of) and International Relations and Policy Departments of the Ministry. More importantly, almost daily communications was established with representatives of NEA to design and cost outputs and activities related to the expansion of hydrometeorological network, hazard assessment, establishment of real-time MHEWSs, river-basin MHRM planning frameworks and capacity building. Public awareness component was elaborated with active participation of representatives of EIEC of the MoEPA. As a result of UNDP's cooperation with MoENRP, the latter through NDA issued a Letter of No Objection (please refer to Annex I), agreed to take over the role of the implementing partner for the GCF project and, committed to co-finance the GCF project in the amount of $US 31.6 million (Please refer to Annex IV to this proposal on MoENRP's co-funding letter), including 20-year O/M of hydrometeorological network.

163. Activities related to agrometeorology were consulted with and designed in close cooperation with representatives of the FAO and several departments and specialized agencies/units of the MoA (since January 2018 integrated into MoEPA), including National Food Agency (NFA), Consultation and Research Center and Irrigation and Regional departments as well as in consultation with providers of agrometeorological stations to NFA under FAO-funded project.

Several high (of Deputy Minister and heads of the departments/agencies level) and technical level round table discussions with MoA staff were held and e-mail communications exchanged during feasibility study on the issues as current capacities of relevant MoA entities, scope, budget and technical architecture of agromet-related activities and co-financing. The confirmation letter on the participation in the project with its own resources in the amount of $US 2.4 Million was issued by the MoA as a result of negotiation (please refer to Annex IV for MoA;s confirmation letter).

164. Several high (Deputy Minister level) and technical level meetings were held and e-mail communications exchanged with representatives of MIA on integration of JOC-24/7 (real-time surveillance and control center) and EMA's risk assessment, response and preparedness activities in warning, communications and dissemination components of the GCF project as well as on MIA's co-funding issues.

165. Close contacts were established with representatives of State Security and Crisis Management Council (SSCMC) and its Crisis Management Center under the Prime Minister's Office to exchange background and project related information, identify the SSCMC role in the GCF project and explore the latter's willingness to engage in the project. The SSCMC expressed its readiness to participate in vulnerability assessments, building a database on social-economic vulnerabilities to multiple hazards, public awareness and capacity building activities and development and adoption of relevant guidance documents and regulations on DRM/DRR and MHEWS.

166. Peer to peer consultations were held and email communications established with representatives of MRDI to co-fund implementation and O/M of a number of flood defense measures in selected high disaster risk areas as well as to implement other structural measures to be funded through GCF. These consultations resulted in mobilization of US$ 7,271,730 million from MRDI to co-finance activity 3.3 of the GCF project (please refer to Annex IV for MRDI's co-funding letter). In addition, an agreement was reached that the Road Department under the MRDI will be a responsible party for activity 3.3.

167. Communication lines were also established with local governments (LGs) of target municipalities where priority structural measures will be implemented within the framework of the GCF project, on taking care of flood defence structures, after they are built, through e-mail correspondence and exchange letters. These efforts ended with commitment of target LGs to fund O/M of flood defence structures to be constructed/rehabilitated under the GCF project (Please refer to Annex IV to this proposal for co-funding letters from target LGs).

168. Very close cooperation was established with Tbilisi Deputy Mayor and the Head of the International Relations Department on inclusion of some of the major recommendations of PDNA in GCF project and on Tbilisi Mayor's office participation in the project. It was agreed that the project would support further institutional strengthening of the municipality's on-going resilience efforts, would assist the office in developing flood response and preparedness plan and would assist the Mayor's Office in developing feasibility studies and detailed designs for one or two priority structural measures for Tbilisi listed in PDNA. From its side, Tbilisi Mayor's Office issued a confirmation letter to participate in the project with its ongoing and future activities (Please refer to Annex IV to this proposal for confirmation letter from Tbilisi Mayor's Office).

169. Other stakeholders consulted during the project design and feasibility study are representatives of Mobile Operators (funding of development and dissemination warnings and various climate/weather advisories/products), Ministry of Energy (resilience and climate proofing of energy infrastructure), Co-investment Fund (resilience and climate proofing of investments funded through the Fund), SDC (co-funding or parallel activities), representatives of EU Water Initiative+ (parallel, complementary activities).

E.6. Efficiency and Effectiveness

Economic and, if appropriate, financial soundness of the project/programme

E.6.1. Cost-effectiveness and efficiency

Adequacy of financing structure

170. Investments to be made under the GCF project will largely create products of public good nature, including climate-induced disaster risk knowledge, MHEWS, MHDRM planning frameworks, enhanced national and local capacities. Therefore, they won't generate any revenues and cost recovery funds during and after implementation of the project. Despite the fact that various user-oriented climate/weather products, such as climate, weather and agrometeorological advisories, that the project will create may generate revenues in the future, at present the private sector is not interested to purchase such products or provide financial resources (either grants or loan) for their development. By no means, loan schemes including microcredits can be considered as an option for financing CBEWS and community resilience actions in remote rural areas, given the poverty level and affordability of local population there. Thus, 100% grant scheme is required to upscale multi-hazard early warning system in Georgia and enhance the resilience of Georgian population including those living in remote mountainous areas.

171. Bearing in mind existing financial, technical, knowledge and capacity barriers towards development and operationalization of almost real-time MHEWS, generation of relevant climate information and, implementation of combined structural and non-structure resilience measures at national, municipal and community levels to combat current and future climate-induced disaster risks the Government of Georgia is not currently in a position to fully finance its DRR and climate change adaptation measures. Therefore, it calls for international aid for technology and knowledge transfer and implementation of CC adaptation measures as outlined in INDC and other DRR-related policy documents. By joining its cash and non-cash resources and other donor funds, including GCF funds, the GoG will be able to implement a number of transformative policies and measures in areas of CC adaptation and DRR and thus, reduce current and future climate-induced disaster risks.

Efficiency and Effectiveness

172. The proposed project builds upon lessons learned and success of the past and on-going interventions, existing data/information, institutional and management frameworks and capacities and, communications and coordination mechanisms operational currently in Georgia in CC and DRR areas. Moreover, it will scale-up the outcomes of the prototype Rioni AF Flood project as well as other baseline projects. Therefore, expanding the scope of already attested and verified interventions with close participation of national-wide and local stakeholders is more cost-effective than the implementation of a completely new initiative.

173. Comparable efforts (EWs, climate information, and community-based DRM) have shown effective impact related to saving of lives, assets, and livelihoods. In Nepal, the community based EWS directly benefit over 80,000 people in communities around river basin systems[11]. Advanced EWS systems are estimated to be 100% effective in reducing loss of life by cyclones, 60% effective for floods, and 20% effective in case of drought. (Teisberg and Weiher (2009)). In Bhutan, EWS project has enhanced capacities of district and local level authorities and communities in disaster risk and climate risk management[12].

174. The project offers a cost-effective alternative to conventional/baseline reactive approaches to risk management that builds around ad-hoc recovery investment and compensations, predominance of large scale hard defense infrastructure and limited community engagement. GCF project catalyzes shift to more cost-effective and efficient approaches to resilience building. The new approach is based on enhaced risk knowledge that allows proactive action to reduce

[11] https://practicalaction.org/docs/region_nepal/early-warning-saving-lives.pdf

[12] http://cfapp2.undp.org/gef/documents/1/g3722/g2_16676/Final%20Technical%20Review%20and%20Social%20IMpact%20Assessment%2EGLOF%20FSP%2Epdf).

exposure of people and economic assets to hazardous events, enhanced design of risk reduction investments, a combination of structural and non-structural measures, enhancing adaptive capacities of local communities.

E.6.2. Co-financing, leveraging and mobilized long-term investments (mitigation only)

N/A

E.6.3. Financial viability

175. Without GCF funding, 1.7 Million people (40% of the population) including the most vulnerable communities in remote rural and densely populated urban areas remain at risk from the main hazards. Annual average damages (AAD) to properties from floods are estimated at 116.3 Million GEL ($US51.2 Million) without climate change and at 282.7 Million GEL ($US 124.4 Million) with climate change. The risk to agricultural land from all hazards is between 251,225 ha and 325,020 ha under baseline and climate change conditions respectively. Annual damages to agriculture from flooding alone would be 126.3 Million GEL (55.6 Million $US) and 154.2 Million GEL (67.8 Million $US) under baseline and climate change conditions respectively. The GoG and particularly, NEA does not have the capacity to manage hazard or provide essential warnings to the public.

176. The public goods nature of this project's outputs doesn't entail significant revenue generation or cost recovery from the project. Where deferred income generation opportunities exist, these apply directly to the beneficiaries (for instance, improved agricultural income) primarily as household income. A financial analysis for the project is therefore not deemed pertinent given there is no profit/income generation from the project. The project cost-benefit analysis is provided in Annexes XIIa, and XIIb.

177. Financial viability of the project investments is assured through a combination of elements that build ownership and the technical, financial, operational and institutional capacities of the national and sub-national governments and local communities to maintain and derive economic, social, environmental benefits from the proposed investments.

178. The project relies entirely on grant finance as the proposed interventions are public goods and there is no revenue generating activity. As the proposed project is non-revenue generating, a traditional financial viability assessment is not appropriate.

E.6.4. Application of best practices

179. International standard and local knowledge-based best practices, approaches and technologies (e.g. numerical hazard modelling, GIS-based socio-economic risk and vulnerability assessment methodologies, real-time hydrometeorological and agrometeorological observations through automated hydrometeorological and agrometeorological monitoring networks, numerical meteorological, hydrological and hydralulic forecasting models, RS techniques, including Lidar, Radar, geodetic surveys, aerial photography and satellite imagery, integrated EWSs, modern telecommunication and information technologies, including GMS, SMS, internet/intranet, CCTV cameras, radio and TV, walkie talkies, etc.) applied under Rioni AF Flood prototype project as well as under other national or overseas funded CC and DRR initiatives will be applied by the GCF project and/or adapted to local conditions. The project is building on the introduction of EU Flood directives methodology which was introduced under the Rioni project for flood risk modelling, the development of the flood forecasting and eary warning system and the EU FD-based flood economics risk modelling and extending these methodologies to the rest fo Georgia while introducing other international bets practice methodologies as detailed in the feasibility report Annex 7.

180. Concerning flood defence structural measures, feasibility study for each of the measure was conducted during project preparation phase and conceptual designs of risk reduction measures were selected based on following criteria:

- ensured safety and stability of the structural measures over the service life-cycle

- investment cost effectiveness
- easy construction and feasibility by local practice of engineering
- availability of materials and other resources
- easiness of operation and less effort for maintenance
- minimal impact on physical and social environment

181. Stemming from above criteria, various relatively low-cost technologies and measures, well-known and widely applied in Georgia were suggested, including gabion walls, lining with boulders, lining with wire mesh mats (so called Reno mat), reinforced concrete cantilever retaining wall on drilled shafts, cleaning of storm water drainage canals, cleaning and renovation of mudflow retention structures (Please refer to FS Annex II for feasibility study of risk reduction structural measures).

182. In conceptualizing the architecture of community-based early warning systems, the GCF project relied on experience, design specifications and costs of CBEWSs piloted in a number of highly vulnerable villages of neighbouring Azerbaijan and supported through SCCF assistance.

183. Community-based multi-hazard risk management processes to be run in parallel to establishment and operationalization of CBEWSs, will follow GIS-based participatory hazards, vulnerability and risk assessment approach that is widely applied abroad and has been also used in Georgia by CENN in 60 pilot communities of Alazani-Iori and Rioni upstream and downstream communities under USAID/GLOWS INRWM project.

184. Concerning the non-structural community resilience measures, including agroforestry, floodplain and watershed restoration, the GCF project will build upon applied practices and lessons learned of Rioni AF prototype and other Donor-supported projects that provided assistance to selected communities across the country in above areas.

E.6.5. Key efficiency and effectiveness indicators

GCF core indicators	Estimated cost per t CO_2 eq, defined as total investment cost / expected lifetime emission reductions (mitigation only)	
	n/a	
	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 only)	
	n/a	
Other relevant indicators (e.g. estimated cost per co-benefit generated as a result of the project/programme)		

**** The information can be drawn from the project/programme appraisal document.***

F.1. Economic and Financial Analysis

Approach and Methodology

185. The economic analysis of the proposed project was carried out in accordance with the *Guidelines for the Economic Analysis of Projects of United Nations Development Program*.[13] The economic efficiency of the investment was determined by computing the economic net present value (NPV) with an assumed 10% discount rate, and the economic internal rate of return (IRR). For consistency purposes, all proposals developed with the support of UNDP have opted to use a 10% discount rate, in line with the existing practice of multilateral development banks.

186. Economic values (costs and benefits) are all measured in real terms of 2017. Economic costs of the project are net of taxes, duties, and price contingencies. Furthermore, the analysis assumes a shadow wage rate of 1.00 for unskilled and semi-skilled labour in Georgia. Provided that the economic cost of labour in Georgia is expected to be lower than the market wage rate (financial cost), we expect this assumption leads to significantly over-estimating the economic cost of the project, and under-estimating the true net economic value of the project.

187. As is common when undertaking the economic analysis of investment projects, numerous assumptions were used to delineate the "with project scenario" from the "without project scenario". These assumptions are presented and discussed in details below. Assumptions were always made so as to under-estimate the true net economic value of the proposed investment project.

188. Details of the economic analysis are presented in Annex XIIa and the Excel spreadsheet in Annex XIIb.

189. Benefits of the project were estimated using the August 2016 report "Upscaling of Rioni Flood Damages to all Georgian Flood Plains and an overview of the Impacts on Population, Property and Agriculture within Georgia from Other Hydro meteorological hazards". The report was based on GIS modelling of spatial economic damages associated with hydro-meteorological hazards and quantified the following:

- Property and people currently at low, medium and high risk based on "Report on "MATRA" project of National Flood Susceptibility Map of Georgia, University of Twente, The Netherlands, 2011"
- Annual Average expected flood damage to property
- Annual Average expected flood damage to agricultural land taking the mean annual loss per hectare

190. The cost-benefit analysis adopted conservative assumptions, and by using only avoided annual average expected flood damages and thus, not counting the benefits to be accrued from avoided damages due to other hydrometeorological hazards. Benefits of improved data and knowledge and capacities were also difficult to quantify therefore, were not integrated in the CBA model, significantly deflating the expected net benefits of the investment project.

191. **Project Cost benefit Analysis:** The net present value (NPV) of the project was estimated to be US$ 23.4 Million, with an internal rate of return (IRR) of 16.6%. The economic efficiency of the project remains favorable under a various set of alternative assumptions.

F.2. Technical Evaluation

192. An architecture of the national-level MHEWS is based on prototype Rioni Flood EWS as well as on best scientific knowledge and international practice for multi-hazard risk monitoring and forecasting. It also takes into consideration technical design and operational specifics of existing hydrometeorological network.

[13] UNDP. 2015. *Guidance on the conduct and reporting of the Economic and Financial Analysis of Climate Change Adaptation and Mitigation Projects and Programmes*. UNDP.

193. The MHEWS will have EWSs for all 11 major river basins and for following hazards: floods and flashfloods (based on Rioni FEWS prototype), landslides, droughts, avalanches, hails and windstorms. This design is based on basin approach and was derived in close consultation and in agreement with NEA representatives.

1940. Suggested MHEWS protocol is based on an assumption that early warnings must reach those at risk on time. Linking the warning provider to communities at risk requires the involvement of numerous actors from different levels and the time available is limited. EWS protocols follow top-down logic, starting from a warning provider and ending to the communities at risk. Protocols include two main decision-making processes: 1) The first process leads to a decision on issuing warnings and the respective warning levels. This usually takes place at the institutions responsible for hazard monitoring and warning ("provider organizations"); 2) The second process leads to a decision on whether to officially call for an evacuation and helps to translate the warning message into guidance for a community at risk. Three-staged process is suggested: normal, alert and warning situations.

195. The project will develop multi-hazard risk management plans for 11 major river basins, utilizing real-time and historic hydrometeorological data, hazard and risk profiles to be developed under the GCF project and standard planning steps and processes.

196. A community based early warning system (CBEWS) is a locally based operational forecasting and warning activities of a community that aids them in mitigating the effects of disasters in their area. This is a relatively cheap, easy to sustain system enhanced by the direct and active participation of the community and its leaders. It is suggested to establish CBEWSs in 100 upstream rural communities. Community-based local monitoring will complement the national monitoring system and will consist of automatic rain gauges, radar sensor type water level monitoring and post-factum community water level monitoring. Three different levels of warning will be defined depending on the time to the event and on the accuracy of the prediction, namely level 1 alert (be aware), level 2 alert (be prepared) and level 3 warning (take action). Community warden mechanism will be introduced in selected communities. Nominated wardens will be persons who will operate community-based early warning systems and disseminate warnings within communities. They will be the persons who will receive warnings from JOC/EMA through various communications means, including SMS, HF radio, email-internet. Remote control sirens can also be used in case contact can't be reached and/or at nights. Means for disseminating warnings among community members or from community to another community are: bells/drums, wireless portative alert sirens, loudspeakers, SMS, walkie talkie, TV and radio. All above technologies proved to work in many rural communities, including rural communities of neighbouring Azerbaijan, but before implementing these schemes local conditions, including demographics, community development level, gender profile will be taken into consideration.

197. CBMHRM process will complement establishment of CBEWS and will be carried out using internationally recognized participatory hazard, vulnerability and risk assessment, DRR planning and implementation practices. A number of communities as well as NGOs in Georgia have experience in community-based DRR and climate adaptation that can be replicated in pilot communities of GCF project.

198. Project sites for risk reduction structural measures were identified in close consultations and agreement with NEA and MRDI, based on the experts' judgement and rapid field assessment. Investment priorities among identified sites were made based on CBA analysis and conceptual designs of suggested for flood defence structures were developed through feasibility assessment of various engineering solutions, based on local peculiarities and knowledge, safety and reliability of the structure, its cost-effectiveness, simplicity of construction works and O/M of structures, availability of construction materials and potential impacts on environment. Regardless of this, structural measures need development of detailed designs that will be carried out during the project implementation.

F.3. Environmental, Social Assessment, including Gender Considerations

199. The project is expected to have moderate environmental and social impacts, although these with be spatially and temporally restricted. To ensure the environment is managed effectively an Environmental and Social Assessment Report (ESAR) (incorporating an Environmental and Social Management Plan) has been prepared for the project. The environmental and social impacts are likely only as a result of the structural interventions. Management Plans have been developed to avoid, and where not possible, to mitigate the environmental and social impacts. Based on the assessment, the project is considered to have a moderate risk, and less so with the management plan actions include the development of an Erosion, Drainage and Sediment Control Plan (EDSCP). Importantly, the technical solutions for structural risk reduction interventions have been tested through a prototype EWS and flood risk management project in Rioni basin and there is evidence of positive impact on local environment over the medium to long term, thereby offsetting the short term environmental impacts. The non-structural interventions combined with expansion of existing hydrometeorological network are unlikely to have medium risk impacts. The project will ensure that all the equipment purchased meets international environmental, safety and technical standards. Efforts will be also made to minimize environmental footprint of project activities, by introducing internal paper-reduction, re-use, water and energy conservation/saving policies.

200. The non-structural community resilience measures, including agroforestry and floodplain/watershed restoration will have limited environmental and social impact. The project will carefully assess and select plant species during project design phase in terms of their conservation and economic values that are of local provenance and have high survival rate, etc. Moreover, during reforestation/afforestation activities, small scale sediment movement may happen and measures have to be taken to control erosion throught the development of an EDSCP. Overall, community resilience measures will create temporary jobs for local community members, including women that can be considered as a short-term positive social impact. Moreover, if high economic value crops/plant species are selected, they may bring additional revenues for local and improve their livelihoods.

201. The ESAR developed during the project design phase will be implemented by the contractor and supervised/monitored by relevant authorities (e.g. MRDI, MoEPA, local governments) in accordance with procedures outlined in the ESAR. A Grievance Redress mechanism contained in the ESMF will be applied where and when it is necessary (Please refer to Annex VI (b)). There are no known indigenous peoples and/or ethnic groups and/or internally displaced peoples known to inhabit the specific areas of the interventions. However, prior to undertaking any intervention, additional stakeholder engagement will be conducted to ensure that any indigenous peoples and/or ethnic groups and/or internally displaced peoples are fully consulted to ensure the project will not impact on them and/or their cultures/traditions. If any people are found to be located within the area, the project will comply with the UNDP Social and Environment Standard and the project will develop a social inclusion plan. A draft template is include in the ESAR.

202. The project does not require land acquisition and/or resettlement of local population. However, it may be necessary to utilise areas of land adjacent to where the structural interventions will be undertaken so as to access water courses (e.g. Khodasheniskhevi and Milari, etc.). The land is currently under agricultural production. Where access is required, the land will be returned in the same condition as it was prior to any access. Access to this land will only be undertaken through voluntary agreements with landholders. Where a voluntary agreement cannot be established, the land will not be used. The majority of project sites are located in sparsely populated rural areas. Only three, Telavi, Gori and Kobuleti project sites are located in urban areas where negative environmental and social impacts during construction works might be more noticeable to people. None of the project sites are located near or within protected areas or natural monuments; there are no recorded important bird areas or habitats for red book plant and animal species. Appropriate mitigation measures are proposed to reduce the potential impacts on people. None of the project sites are located in proximity to important archaeological or other type of cultural heritage site. Notiwthstanding, in the case of any chance find, necessary measures have been included in the ESAR in order not to damage the archaeological artifacts. None of the projects require setting construction camps and thus; environmental impacts from campsites are not expected. All structural interventions include sediment removal from water course and any earth excavation works will be undertaken by heavy machinery. These activities may create such environmental and social impacts which may result in deletrous short term and spatially restricted impacts including dust, traffic and noise, pollution of land, water and air from vehicle exhausts, used oils, excavated soil, river bank and bed erosion and degradation of floodplain vegetation and landscapes. The ESAR includes measures that

will be implement to control adverse impacts. The ESAR also requires the contractor to undertake all activites and adhere to environmentally sound site management practices, by planning and implementing activities in a way to reduce traffic, keep strongly the site boundaries/limits, not carry out earth and construction works during rainy days, install soil erosion control structures (embankments, collectors, etc.). Further, it is necessary to implement site rehabilitation measures, including re-vegetation at some sites after completion of construction works. Necessary measures have to be taken to avoid over-surface runoff and drainage of soil and turbid water into natural water bodies by stabilizing the soil piles and by avoiding construction works during rainy days. Major wastes that would be generated during construction phase would be unused soil and leftover concrete and boulder. Where possible, this material should have a beneficial reuse option, including using good material for agricultural purposes. Where this is not possible, any materials should be disposed on specially allocated land plots, pre-agreed with local authorities or could be distributed among local farmers for various beneficial uses.

203. Negative social impacts during construction phase may arise from work placen injuries as well as during transporting construction materials or construction crew. Traffic and workplace safety precautions should be taken by construction crew, including all construction staff wearing PPE and complying with Georgian laws, technical norms and standard while dealing with machinery and equipment. Consistent with the ESAR, crews should always have the medical kits on-site as well as should have assigned wardens among them in order to contact relevant rescue and medical teams in case of emergencies. Overall, the crew should follow rules and procedures of the emergency management plan outlined in the ESAR.

204. During construction phase temporary jobs for locals can be created as a short-term positive impact. However, the long-term sustainable positive social and environmental impacts of the project and in particular, flood defence structures will be avoided losses in human lives, assets, agricultural lands and ecosystems. In total, 1.7 million people will benefit from the initiative, of which 52% are women.

205. In case stakeholder concerns and complaints detected during monitoring/inspection visits or otherwise communicated to the management of the contractor and MRDI Road Department, a responsible party for the activity, these concerns should be addressed properly in a writing form within a period defined in the grievance redress mechanism.

206. Negative environmental impacts associated with operations phase are solely related to proper O/M of the structures. The lifetime of the structures is about 20 years and during this timespan such measures, as cleaning canals from vegetation/weeds and sediments or conducting minor repairs may become necessary annually or within reasonable intervals. In case these structures are damaged/scoured/dilapidated as a result of improper aftercare, then damming the canals and flooding downstream areas can happen. Thus, it is necessary to follow O/M plan, developed during project feasibility phase.

F.4. Financial Management and Procurement

207. The financial management and procurement of this project will follow UNDP financial rules and regulations available here: https://info.undp.org/global/documents/frm/Financial-Rules-and-Regulations_E.pdf

208. Further guidance is outlined in the financial resources management section of the UNDP Programme and Operations Policies and Procedures available at https://info.undp.org/global/popp/frm/Pages/introduction.aspx.

209. UNDP has comprehensive procurement policies in place as outlined in the 'Contracts and Procurement' section of UNDP's Programme and Operations Policies and Procedures (POPP). The policies outline formal procurement standards and guidelines across each phase of the procurement process, and they apply to all procurements in UNDP. See here: https://info.undp.org/global/popp/cap/Pages/Introduction.aspx. Procurement of services and goods will be done in a cost effective and reliable way and by applying following principles: **Best Value for Money**, which consists of the selection of the offer that best meets the end-users' needs and that presents the best return on investment; **Fairness, Integrity and Transparency,** which ensures that competitive processes are fair, open, and rules-based. All potential vendors will be treated equally, and the process will feature clear evaluation criteria, unambiguous solicitation instructions, realistic requirements, and rules and procedures that are easy to understand; **Effective International Competition,** understood

as giving all potential vendors timely and adequate information on UNDP requirements, as well as equal opportunity to participate in procurement actions; and **In the best interest of UNDP**, which means that any business transactions must conform to the mandates and principles of UNDP and the United Nations. As outlined in the Procurement Plan, procurement of goods and services will be mainly carried out by UNDP and the UNDP procurement procedures will be applied (POPP). However, for certain project inputs, procurement will be done by the national project Responsible Parties engaged through standard Letters of Agreement (LoA) signed between UNDP and responsible party (such as NEA, EIEC, NFA, Road department unde MRDI). Procurement by Responsible Parties under the LoAs will be done through centralized e-procurement system managed by the State Procurement Agency (http://procurement.gov.ge). It is noteworthy, that prior to issuing LoA, UNDP capacity assessments are conducted for the IP/RPs to determine their capacities and fiduciary standards, including for procurement and to confirm compliance of these standards with international principles for procurement. In addition, UNDP conducts 'spot check's annually for each LoA signatory entity. Additional detailes on the UNDP procurement threthholds and methods are provided in the Annex XIIIa. Procurement Plan.

210. The project will be implemented following the National Implementation Modality (NIM) following NIM guidelines available at: https://info.undp.org/global/documents/_layouts/WopiFrame.aspx?sourcedoc=/global/documents/frm/National%20Implementation%20by%20the%20Government%20of%20UNDP%20Projects.docx&action=default&DefaultItemOpen=1

211. UNDP ascertains the national capacities of the Implementing Partner/Executing Entity and Responsible Parties by undertaking an evaluation of capacity following the Framework for Cash Transfers to Implementing Partners/Executing Entities (part of the Harmonized Approach to Cash Transfers - HACT).

212. All projects will be audited following the UNDP financial rules and regulations noted above and applicable audit guidelines and policies. According to the current audit policies, UNDP will be appointing the auditors. In UNDP scheduled audits are performed annually, during the programme cycle as per UNDP assurance/audit plans, on the basis of the implementing partner's risk rating and UNDP's guidelines. The project financial statements will comply with international accounting standards. A scheduled audit is used to determine whether the funds transferred to the implementing partner were used for the appropriate purpose and in accordance with the work plan. A scheduled audit can consist of a financial audit or an internal control audit.

213. The NIM Guidelines are a formal part of UNDP's policies and procedures, as set out in the UNDP Programme and Operations Policies and Procedures (POPP) which are available here: https://info.undp.org/global/popp/Pages/default.aspx. The NIM Guidelines were corporately developed and adopted by UNDP, and are fully compliant with UNDP's procurement and financial management rules and regulations.

214. The national executing entity, MoEPA - also referred to as the national 'Implementing Partner' in UNDP terminology - is required to implement the project in compliance with UNDP rules and regulations, policies and procedures (including the NIM Guidelines). In legal terms, this is ensured through the national Government's signature of the UNDP Standard Basic Assistance Agreement (SBAA), together with a UNDP project document which will be signed by the Implementing Partner to govern the use of the funds. Both of these documents require compliance.

215. The national Implementing Partner and all Responsible Parties have undergone a Harmonized Approach to Cash Transfer (HACT) assessment to assess capacities to implement the project. The assessment reports are attached to the Full Proposal. During implementation, UNDP will provide oversight and quality assurance in accordance with its policies and procedures, and any specific requirements in the Accreditation Master Agreement (AMA) and project confirmation to be agreed with the GCF. This may include, but is not limited to, monitoring missions, spot checks, facilitation and participation in project board meetings, quarterly progress and annual implementation reviews, and audits at project level or at Implementing partner level on the resources received from UNDP.

G.1. Risk Assessment Summary

216. Risk factors associated with the project implementation include institutional, policy, financial, technical and operational aspects to create and run properly MHEWS both national-wide and at community level; and social and environmental due to the implementation of climate-resilient livelihoods initiatives and construction of protective infrastructures against hydrometeorological risks. The risk may affect the sedimentation movement during construction of flood defence infrastructures. Other risks may affect the lack of commitment from communities where restoration activities, alternative livelihoods and EWS are planned.

217. The proposed project includes several mitigation measures to address these risks. This mitigation strategies include preparing an erosion control sediment plan and installing silt curtains to restrict sediment movement during implementation of structural and non-structural community resilience measures.

G.2. Risk Factors and Mitigation Measures

Please describe financial, technical and operational, social and environmental and other risks that might prevent the project/programme objectives from being achieved. Also describe the proposed risk mitigation measures.

Selected Risk Factor 1

Description	Risk category	Level of impact	Probability of risk occurring
Political situation becomes instable due to local upheavals or regional conflicts	Other	High (>20% of project value)	Low

Mitigation Measure(s)

The project will develop and implement emergency management/contingency plan in line with UNDP CO's crisis management requirements. This may reduce the level of impact of the risk to medium to low level

Selected Risk Factor 2

Description	Risk category	Level of impact	Probability of risk occurring
Hydrometeorological and/or flood defence infrastructure are destroyed due to various natural hazards	Social and environmental	High (>20% of project value)	Medium

Mitigation Measure(s)

The project will develop and implement emergency management/contingency plan in line with UNDP CO's crisis management requirements. During the design and constructing of relevant infrastructure disaster risks will be taken into consideration or in other words, climate proofing will be carried out. These activities will reduce the level of impact and probability that the infrastructure will be destroyed to minimum level

Selected Risk Factor 3

Description	Risk category	Level of impact	Probability of risk occurring
Climate adaptation and EWS/DRR do not stay a government priority and therefore, the latter's political, financial and technical support to these areas and particularly, to the project is reduced	Other	High (>20% of project value)	Low
Mitigation Measure(s)			
The project will have constant consultations with high-level government representatives and will carry out lobbying and advocacy campaigns in support of CC adaptation, EWS and DRR. This will reduce the impact of the risk to the minimum level			
Selected Risk Factor 4			
Description	Risk category	Level of impact	Probability of risk occurring
Absorption and operational capacities of project responsible parties and particularly, NEA stay inadequate to properly run and maintain MHEWS	Technical and operational	High (>20% of project value)	Medium
Mitigation Measure(s)			
The project will pay high attention to the capacity building of all relevant agencies through carrying out training of trainers, on-the-job and field trainings of the staff of relevant agencies, introducing/strengthening internship mechanisms within responsible parties and particularly NEA, developing technical guidelines, methodologies and sustainable operations and maintenance plans for established national-wide MHEWS. Altogether will reduce probability and impact of the risk to minimum level.			
Selected Risk Factor 5			
Description	Risk category	Level of impact	Probability of risk occurring
Due to poor financial performance of the government and particularly, ministries and agencies engaged in the project as responsible parties, significant budget and staff cuts occur in these state organizations	Technical and operational	High (>20% of project value)	Medium
Mitigation Measure(s)			
The project will assist the government authorities to develop and implement sustainable long-term financial plan for running MHEWS, including the plan for engaging private sector in the area as well as accessing international donor financing.			
Selected Risk Factor 6			

Description	Risk category	Level of impact	Probability of risk occurring
Local communities are not interested to be engaged in CBEWS and CBMHRM processes	Other	Medium (5.1-20% of project value)	Medium
Mitigation Measure(s)			
The project will conduct aggressive awareness campaign at grassroots' level on the climate-induced natural hazards, vulnerabilities and risks and benefits for reducing these risks. It will also make significant efforts to mobilize and empower local communities in CBEWS and CBMHRM. This will reduce the impact and probability of the risk to the minimum			
Selected Risk Factor 7			
Description	Risk category	Level of impact	Probability of risk occurring
No finances are available for proper operation and maintenance of CBEWS	Financial	Medium (5.1-20% of project value)	Medium
Mitigation measure(s)			
The project will use volunteer warden's schemes for operating local early warning system as well as will make efforts to integrate them into national-wide system and management and institutional structures (kept by NEA and MIA). Moreover, the project will seek for minimum level financing for O/M of the system within local authorities, NEA and EMA. These measures will reduce the level of impact to the minimum			
Selected Risk Factor 8			
Description	Risk category	Level of impact	Probability of risk occurring
Multi-hazard plans are not implemented	Technical and operational	Medium (5.1-20%) of project value	Medium
Mitigation measure(s)			
The project will engage all level stakeholders, including line Ministries, international aid organizations, development banks and private sector in discussion and endorsement of the plans. Moreover, it will facilitate official adoption of the plans by the government and will advocate and lobby to include priority measures of the plans in state and municipal budgets. These measures will reduce the level of risk to the minimum			
Selected Risk Factor 9			
Description	Risk category	Level of impact	Probability of risk occurring
Sediment movement during riverbank works	Social and environmental	Medium (5.1-20% of project value)	Medium
Mitigation measure (3)			

There is the likelihood for sediment movement during the construction of hard infrastructure. To ensure that the sediment is not mobilised that will result in environmental impacts, it will be necessary to prepare an Erosion, Drainage and Sediment Control Plan (EDSCP) and install silt curtains to restrict sediment movement from the site. Further, any earthworks should be undertaken during the dry season and compacted sufficiently to reduce sediment movement. The EDSCP should contain aspects including but not limited to the installation of sediment curtains to reduce sediment movement and the quick placement of footing material. These impacts will be spatially and temporally restricted to works periods.			
Selected Risk Factor 10			
Description	Risk category	Level of impact	Probability of risk occurring
Sediment movement during ecosystem revegetation works	Social and environmental	Low (<5% of project value)	Low
Mitigation measure (3)			
There is the potential for sediment movement during planting and reforestation. To ensure that the sediment is not mobilised through either wind or more specifically water movement, it will be necessary to prepare an EDSCP and install silt curtains to restrict sediment movement and the covering of sediment where practicable.			
Selected Risk Factor 11			
Description	Risk category	Level of impact	Probability of risk occurring
Contamination of existing water sources	Social and environmental	Medium (5.1-20% of project value)	Medium
Mitigation measure (3)			
To ensure contaminants do not enter waterways and groundwater systems, a water quality monitoring plan will be developed to ensure chemicals are not released. This will involve testing sediment prior to movement and planning so that the works are not undertaken during rain events. Where rainfall is anticipated, appropriate material should be placed under the sediment prior to excavation to ensure there is no seepage into groundwater systems. The water quality monitoring for the sources will be designed to identify potential impacts so that management measures can be proactively rather than reactively enacted upon.			
Selected Risk Factor 12			
Description	Risk category	Level of impact	Probability of risk occurring
Construction Noise	Social and environmental	Low (<5% of project value)	Low
Mitigation measure (3)			
The construction contractor should consider any sensitive receptors including communities. Noise will be limited to excavators removing sediment from the water course. It is likely that more noise will be generated through the use of excavators and trucks moving sediment. Where necessary, noise shields should be			

constructed to reduce the potential for noise to reach these communities if an impact occurs. The noise will have very limited temporal scales.			
Selected Risk Factor 13			
Description	Risk category	Level of impact	Probability of risk occurring
Sediment movement during the installation of hydro-meteorological observation equipment for the MHEWS	Social and environmental	Low (<5% of project value)	Low
Mitigation measure (3)			
When undertaking the installation of weather stations, the ESAR and EDSCP will be followed to ensure runoff does not flow into riverine systems			
Selected Risk Factor 14			
Description	Risk category	Level of impact	Probability of risk occurring
Locating infrastructure that is socially detrimental	Social and environmental	Low (<5% of project value)	Low
Mitigation measure (3)			
Stakeholder consultation will be undertaken prior to the selection of infrastructure sites to ensure no impacts. No interventions will be undertaken on private land.			
Selected Risk Factor 15			
Description	Risk category	Level of impact	Probability of risk occurring
Agroforestry activities on local pasturelands	Social and environmental	Low (<5% of project value)	Low
Mitigation measure (3)			
Stakeholder consultation will be undertaken prior to the selection of agroforestry sites to ensure no conflicts. Economic benefits from protecting housing, infrastructure and agricultural land are expected to be higher than opportunity costs related to planting on grazing land. Planting of economically feasible tree species (fruits, nuts) are part of the bioengineering measures.			
Selected Risk Factor 16			
Description	Risk category	Level of impact	Probability of risk occurring
Physical and Economic Displacement related to intervention construction	Social and environmental	Low (<5% of project value)	Low
Mitigation measure (3)			
It may be necessary to utilise areas of land adjacent to where the structural interventions will be undertaken so as to access water courses (e.g. Khodasheniskhevi and Milari, etc.). The land is currently under agricultural production. Where access is required, the land will be returned in the same condition as			

it was prior to any access. Access to this land will only be undertaken through voluntary agreements with landholders. Where a voluntary agreement cannot be established, the land will not be used.			
Selected Risk Factor 17			
Description	Risk category	Level of impact	Probability of risk occurring
Impacts on indigenous peoples and/or ethnic groups and/or internally displaced peoples	Social and environmental	Low (<5% of project value)	Low
Mitigation measure (3)			
Prior to undertaking any intervention, additional stakeholder engagement will be conducted to ensure that any indigenous peoples and/or ethnic groups and/or internally displaced peoples are fully consulted to ensure the project will not impact on them and/or their cultures/traditions. If any people are found to be located within the area, the project will comply with the UNDP Social and Environment Standard and the project will develop a social inclusion plan.			

** Please expand this sub-section when needed to address all potential material and relevant risks.*

H.1. Logic Framework.

Please specify the logic framework in accordance with the GCF's Performance Measurement Framework under the Results Management Framework.

H.1.1.Paradigm Shift Objectives and Impacts at the Fund level[14]						
Paradigm shift objectives						
Increased climate-resilient sustainable development	*The project objective is to reduce exposure of Georgia's communities, livelihoods and infrastructure to climate-induced natural hazards through a well-functioning nation-wide multi-hazard early warning system and risk-informed local action. The GCF project will provide critical climate risk information that would enable the Government of Georgia to implement a number of nation-wide transformative policies and actions for reducing exposure and vulnerability of the population to climate-induced hazards. The project will thus catalyze a paradigm shift in the national climate risk management, climate-proofed disaster risk reduction and early warning approaches. The project innovation and transformative change will also include (a) participatory "Last Mile" communication solutions tailored to the needs of local communities, including CBEWSs; (b) increasing implementation capacities for carrying out cost-effective risk reduction and community resilience measures through such innovative approaches as watershed/floodplain restoration, agroforestry, etc., and combination of structural and non-structural protection measures aimed at reducing exposure and increasing effectiveness of the early warning; (c) combining best available science and local knowledge for vulnerability assessment, hazard and risk mapping, disaster modelling and forecasting; (d) (e) carrying out a comprehensive community, municipal and national-wide awareness raising, education and capacity development activities on multi-hazard risk reduction, including preparedness, response and EWSs.*					
Expected Result	**Indicator**	**Means of Verification (MoV)**	**Baseline**	**Target** Mid-term (if applicable)	**Target** Final	**Assumptions**
Fund-level impacts						
GCF core indicator	Total number of direct and	Census data Baseline and periodic vulnerability assessments and surveys MIA data SSCMC data Impact evaluation programme	No project	Institutional, legal and policy frameworks and technical monitoring capacities in place in readiness for the implementation of the MHEWS.	Direct beneficiaries: 1,7 million people (47% of population, 0.89 Million women and 0.82 Million men) in the vulnerable/high-risk communities, and regions become more resilient through the access to early warnings/ MHEWS and other risk reduction measures Indirect beneficiaries (including direct): 3.6 Million people (all Georgian	Capacities created at relevant agencies through the project are maintained and periodically renewed and catalyse improved natural hazard and risk management Spatial planning will lead to the desired changes in land use and behavioural control of the population to minimise exposure Political will to implement relevant legal-regulatory reform for effective and efficient MHRM/MHEWS Government engages in development of the plans, endorses and commits to implement it through resource mobilization Strong political will for MHRM planning platform and active participation of all relevant

[14] Information on the Fund's expected results and indicators can be found in its Performance Measurement Frameworks available at the following link (Please note that some indicators are under refinement): http://www.gcfund.org/fileadmin/00_customer/documents/Operations/5.3_Initial_PMF.pdf

	indirect beneficiaries (% of whom is female)		benefici aries as yet		population; incl. 1.88 Million women and 1.72 Million men) benefit from the enhanced nation-wide EWS and climate-informed planning and risk management through reduced damages to infrastructure, reduced loss of livelihoods and disruption to economic activity, reduced impact on GDP and reduced recovery costs	sectors All supporting structures/services for implementation of advisory services are available and trained (e.g. agricultural extension services, NGO, CBO communities) MHEWS results in effective awareness raising, early warnings and response actions of communities at risk that will a) minimise life loss; b) catalyse changes in agricultural practices and spatial planning decisions that will reduce agricultural losses;
1.0 Increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions	1.1 Change in expected losses of lives and economic assets (US$) due to the impact of extreme climate-related disasters	MIA data SSCMC data Project reports District government data	0	Protection of over 1,500 ha of agricultural land and 1,750 properties through 6 structural flood protection measures directly benefiting 3,250 people	Protection of over 3,000 ha of agricultural land and 3,500 properties for the total of $19.4 million through 13 structural flood protection measures directly benefiting 6,500 people	Structural and non-structural measures meet their design standards in reducing the risks to populations and reduction in agricultural land loses

H.1.2. Outcomes, Outputs, Activities and Inputs at Project/Programme level

Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term (if appli-cable)	Final	
Project Outcomes	**Outcomes that contribute to Fund-level impacts**					
5.0 Strengthened institutional and regulatory systems access climate finance from the GCF and other funds'	*5.2 Number and level of effective coordination mechanisms*		0	1	3	

6.0 Increased generation and use of climate information in decision-making are also proposed *7.0. Strengthened adaptation capacity and reduced exposure to risk*	*6.0 Use of climate information products/services in decision-making in climate-sensitive sectors* *7.1 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.* *7.2. Total geographic coverage of climate related early warning systems and other risk reduction measures established/ strengthened*	National climate change and DRM/DRR policies, plans and reporting at the national, district, and community levels; MIA data on the performance of the MHEWS; Project reports: annual reports; mid-term and final evaluations, site visits.	Absence of MHEWS across the country at all levels; Fully functional FFEWS exists only for Rioni; Low public awareness of MHEWSs, risk reduction and resilience measures; Absence of knowledge and standardized methodologies on hazard, vulnerability and risk assessments.	50% of Climate-informed multi-hazard risk reduction and management planning frameworks and implementation capacities are in place 50% of Households, business and public sector services in Georgia with access to EWS services and relevant climate risk information Agricultural risk information products developed. National MHEWS Protocol and CBEWS designed By the mid-term project, MHEWS established in 4 major river basins – - and necessary institutional/regulatory framework for its smooth and effective operations set; CBEWSs are established in 30 high-risk settlements	Climate-informed multi-hazard risk reduction and management planning frameworks and implementation capacities are in place 100% of Households, business and public sector services in Georgia with access to EWS services and relevant climate risk information By the end of the project, MHEWS established in all major 11 river basins – the entire territory of the country - and necessary institutional/regulatory framework for its smooth and effective operations set; CBEWSs are established in 100 high-risk settlements	Government has a political will, institutional capacity and necessary resources to support proper O/M of MHEWS No staff and budget cuts occur at NEA Target communities understand shorter- to longer-term benefits of MHEWSs and risk reduction interventions and engage on a voluntary basis in operations and maintenance of such systems
Project/programme outputs	**Outputs that contribute to outcomes**					
1. Expanded hydro-meteorological observation network and modelling capacities secure reliable information on climate-induced hazards,	1.1. Number of new hydro-meteorological monitoring equipment purchased, installed and operational	Project reports, evaluation reports, site observations, databases, web-sites, monitoring and risk assessment products	Hydrometric monitoring network outdated and inadequate	1.1. Hydro-meteorological observation network expanded with: 12 meteostations, 73 meteoposts, 44 hydrological posts, 13 snow measurement stations, 20 inclinometers, 8 mobile discharge	1.1. Hydro-meteorological observation network expanded with: 12 meteostations, 73 meteoposts, 44 hydrological posts, 13 snow measurement stations, 20 inclinometers, 8 mobile discharge meters; 3 radars; 2	Government commitments to secure adequate O/M of monitoring equipment, relevant software and databases are fulfilled on a continuous basis both during the project implementation and afterwards

vulnerability and risks				meters; 3 radars; 2 drones; upper air sounding equipment (x2); 15 web-based agrometeorological stations, 1 super computer for EWS operation; telecommunication system equipment. Community members (both men and women) raise no concerns neither complains due to installation of observation equipment. Verified through the independent evaluations.	drones; upper air sounding equipment (x2); 15 web-based agrometeorological stations, 1 super computer for EWS operation; telecommunication system equipment. Community members (both men and women) raise no concerns neither complains due to installation of observation equipment. Verified through the independent evaluations.	
	1.2 Number of river basins for which hazard and risk maps (covering landslides, mudflows, avalanches, hailstorms and droughts), flood plain zoning and multi-hazard vulnerability and risk assessments	Knowledge system: e-library, created databases, information systems, knowledge portal	Lack of key data sets for development of hazard and risk models	1.2. For 7 major river basin in Georgia hazard and risk maps, flood plain zoning and multi-hazard vulnerability and risk assessments are in place (covering landslides, mudflows, avalanches, hailstorms and droughts)	1.2. For all 11 major river basin in Georgia hazard and risk maps, flood plain zoning and multi-hazard vulnerability and risk assessments are in place (covering landslides, mudflows, avalanches, hailstorms and droughts)	Capacities built across relevant agencies through the project are maintained and periodically updated
	1.3: Introduction and implementation of methods and tools for the systematic gender-sensitive socio-economic vulnerability assessment for decision making for prioritisation of resilience investments.		Lack of socio-economic data for risk, damages, losses, exposure and vulnerability assessments (beyond Rioni River Basin).	1.3 (a) Socio-economic data collection tool developed and embedded at local and central institutionsl to systematically collect damages and losses data at all levels: central, municipality and community level. Bespoke GIS-based socio-econpmic modelling tool develeped and embedded into central and local institutiuons.	1.3 (a) Socio-economic data collection tool developed and embedded at local and central institutionsl to systematically collect damages and losses data at all levels: central, municipality and community level. Bespoke GIS-based socio-econpmic modelling tool develeped and embedded into central and local institutiuons. 1.3 (b) Baseline, progress and final report on social and gender vulnerability.	Relevant government agencies cooperate on the implementation of the MHEWS and data management (MoEPA/NEA, MIA, SSCMC).

	1.4 A centralized multi-hazard disaster risk information and knowledge system		Flood plain zoning, flood risk maps and vulnerability assessment available only for Rioni Basin	1.3 (b) Baseline and progress report on social and gender vulnerability. At least 30% participants of consultations are women 1.4 A multi-hazard information system/central data depository and knowledge portal designed	At least 30% participants of consultations are women 1.4 A multi-hazard information system/central data depository and knowledge portal fully implemented	Spatial planning will lead to the desired changes in land use and behavioural control Availability of alternative land to house people or compensate for lost farming/economic opportunities
2. Multi-hazard early warning system and new climate information products supported with effective national regulations, coordination mechanism and institutional capacities.	2.1 Status of the nation-wide MHEWS covering landslides, floods, mudflows, avalanches, hailstorms and droughts in place	Regulatory framework for MHEWS, SOPs, communication protocols, institutional EWS implementation plans.	MHEWS does not exist: institutional responsibilities and communication protocols for EWS, climate and disaster risk management are not properly defined. FFEWS is available only for the Rioni river basin.	2.1 Operational MHEWS for floods, landslides, mudflows, avalanches, hailstorms and droughts in place covering 4 river basins, including: multi-hazard forecasting platform, national warning communication protocols, telecommunication systems, warning dissemination systems. Warnings are tailored to the needs of vulnerable groups; Information on hazards delivered through multiple methods. Information is clear and not complex. Information is issued in understandable for the population languages.	2.1 Operational MHEWS for floods, landslides, mudflows, avalanches, hailstorms and droughts in place covering all major 11 river basins, including: multi-hazard forecasting platform, national warning communication protocols, telecommunication systems, warning dissemination systems. Warnings are tailored to the needs of vulnerable groups; Information on hazards delivered through multiple methods. Information is clear and not complex. Information is issued in understandable for the population languages.	Government has political will to implement relevant legal-regulatory reform for effective and efficient MHRM/MHEWS
	2.2 Level of institutional capacity for implementation of MHEWS and delivery of climate information among key government	Institutional capacity assessment scorecard for MoEPA and MIA (before the project, mid-term and final)	Institutional and technical capacities for the imple-mentation and maintenance of the nation-wide MHEWS a multi-hazard early warning system	2.2. At least 25% increase over baseline in institutional capacity within MoEPA, NEA, NFA, MIA, EMA to provide early warning and climate advisories in 11 river basins. Gender considerations are	2.2. At least 50% increase over baseline in institutional capacity within MoEPA, NEA, NFA, MIA, EMA to provide early warning and climate advisories in 11 river basins. Gender considerations are reflected in policy	CMC and other relevant government units are willing to cooperate and conduct regulatory and institutional reform

	agencies (MoEPA, NEA, NFA, MIA, EMA) – measured through institutional capacity assessment scorecard		are either absent or very limited	reflected in policy documents and technical guidance (review by gender advisor)	documents and technical guidance (review by gender advisor)	
	2.3 Number of farmers with access to medium and short range weather forecasts and longer term predictions for agriculture (seasonal, decadal etc.).	Review of the river basin MHRM plans, feedback from the MoEPA on the introduction of the MHRM plans into national river basing management plans.	Absence of climate-proof basin level MHRM plans and municipal level multi-hazard response and preparedness plans	2.3 Weather/climate advisories integrating the needs of men and women, and tailored delivery and communication methods designed.	2.3.700,000 farmers with access to medium and short range weather forecasts and longer term predictions for agriculture (seasonal, decadal etc.)	Capacities created as a result of project are maintained and periodically upgraded; Women involvement is encouraged
	2.4: Climate-informed planning platforms: - number of multi hazard basin risk management plans; - number of Municipal-level climate-induced multi-hazard response and preparedness plans; Number of women in planning teams and consultation groups	Status of the municipal multi-hazard response plans; surveys of targeted municipalities on the utilization of the plans. Project reviews, progress reports, independent evaluation report, peer reviews.		2.4. Five (5) Municipal multi-hazard risk management response and preparedness plans Women constitute at least 30% in in planning teams and consultation groups. Gender considerations are reflected in planning (review by gender advisor)	2.4.Eleven (11) Multi hazard River Basin Risk Management Plans; Ten (10) Municipal multi-hazard risk management response and preparedness plans Decision makers and practitioners are trained on gender Women constitute at least 30% in in planning teams and consultation groups. Gender considerations are reflected in planning (review by gender advisor	Various Sectoral Ministries, particularly MoEPA and its specialized agencies are willing to engage in the programme and transfer received know-how to farmers; farmers understand the benefits of climate advisories and engage in the programme eagerly; private sector is interested in developing and providing or receiving climate advisories Government engages in each step of the development of the plans, endorses it officially and takes a commitment to implement it through allocation of relevant funds for implementation of priority measures and/or resource mobilization Local governments engage in each step of the development of the plans, endorse it

						officially and takes a commitment to implement it through allocation of relevant funds for implementation of priority measures and/or resource mobilization
3. Improved community resilience through the implementation of the MHEWS and priority risk reduction measures	3.1 (a) Number of high-risk communities covered with CBEWS and community-based climate risk management (CBCRM) action. (b) women participation in CBCRM action 3.2. (a) Number of communities trained and empowered to implement CBEWS and CBCRM action. (b) Numbre of women among tranees and beneficiaries of the CBCRM schemes.	Project reports, site visits/inspections, final evaluation Community climate resilience plans Community impact evaluation programme CRM and CBEWS guidelines; information materials; training reports; media coverage Structural measures completion reports and hand over notes; engineering inspection reports, environment compliance reports	Community based EWS and "last mile" communication of warnings are not practiced in Georgia Absence of systematic community-based gender sensitive CBCRM Low knowledge and awareness of MHRM and EWSs at municipal and community levels; absence of media and information campaigns on the topic Climate risk knowledge is not adequately integrated into the design of structural protection measures	3.1 (a) 30 high-risk communities are covered with the CBEWS and adopt gender sensitive CBCRM action. Institutional, legal and policy frameworks and technical capacities in place in readiness for the implementation of the CBEWS. (b) Community consultation groups with at least 30% representation of women; Ratio of women employed in CBDRM employment guarantee schemes at least 30%. 3.2.(a) 5 people in each of the 30 CBEWS communities trained to operate and maintain CBEWS and issue warnings; Emergency plans for educational institutions, Staff informed on nature and effects of hazards. Record of emergency drills practiced. Number of staff with the knowledge of first aid. (b) Women comprise 30% of trainees. Information tailored to the needs of men, women, boys and girls	3.1 (a) 100 high-risk communities are covered with the CBEWS and adopt gender sensitive CBCRM action; (b) Community consultation groups with at least 30% representation of women; Ratio of women employed in CBDRM employment guarantee schemes at least 30%. 3.2.(a) 5 people in each of the 100 CBEWS communities trained to operate and maintain CBEWS and issue warnings; Emergency plans for educational institutions, Staff informed on nature and effects of hazards. Record of emergency drills practiced. Number of staff with the knowledge of first aid. (b) Women comprise 30% of trainees. Information tailored to the needs of men, women, boys and girls	Communities actively participate in setting and O/M of CBEWS and developing and implementing multi-hazard risk reduction measures Local governments are capable and willing to support implementation of community resilience measures and to meet their commitments for O&M Women engagement is encouraged by community members and local authorities

	3.3 Number of people (% of whom are female) directly benefitting from improved flood protection through structural flood protection measures 3.4. Increase in crop yields and in household income in target communities due to reduced losses and damages from hazards			3.3. 3,250 people from 5 municipalities benefit from improved flood protection through 6 structural flood protection measures; 3.4. Impact monitoring programme designed and launched. Ratio of women in stakeholder consultations reflects adequate representation of women.	3.3 6,500 people from 11 municipalities benefit from improved flood protection through 13 structural flood protection measures 3.4. 10% increase in crop yields and 5% increase in household income in target communities due to reduced losses and damages from hazards. Ratio of women in stakeholder consultations reflects adequate representation of women.	The CEIE has relevant capacity and dedication to carry out education and outreach activities at all levels The CEIE cooperates productively with EMA, Ministry of education and science, CMC and other agencies and NGOs in capacity building, outreach and education activities MRDI fully meets its commitment towards implementation of structural flood protection measures
Activities	**Description**		**Inputs**		**Description**	
1.1. Expansion of the hydrometric network	he project will contribute significantly to the expansion and upgrade of the national observation network covering multiple climate-induced hazards, including hydrometeorological and agrometeoroloical network. The observation network of all hydrological, meteorological and agrometeorological variables will be established to provide an appropriate level of spatial resolution of these variables. While this project will establish and rehabilitate these monitoring stations, their long-term maintenance will be assured by the government of Georgia and specifically by the NEA and MoEPA that has the dedicated staff and associated budget allocations for continued maintenance and operation of monitoring and early warning systems (corresponding letter of co-financing for the operations and maintenance costs is attached to the proposal). Under the project, the training of staff will ensure that the capability and competences are		- Equipment specifications; - Bills of quantities; - Tender dossier; - Procurement of equipment; - Network installation, calibration and operationalization; - Supervision of works -Technical expertise, local and international; - Supervision of installation works; - Project management; - Labor		The following new equipment is included in the design of the up-graded observation and monitoring network (GCF-funded and co-financed): 12 meteorological stations, 73 meteorological posts, 44 hydrological posts, 10 snow measurement stations, 20 inclinometers; 3 radars;2 drones and additional corpus; matrice 600 pro for flight control and thermal camera; visual computing appliance (VCA) for processing areal photos; geopositioning equipment; upper air sounding equipment (x2); 15 agrometeorological stations, 8 mobile discharge meters, 1 super computer for strengthening early warning system; telecommunication system equipment. Detailed justification and description of the expanded network is provided in the Feasibility Study document, section 3.2.	

	established (see Activity 2.1) and as part of the institutional strengthening, the project will identify mechanisms for guaranteeing government budget commitment for long-term maintenance of the national hydrometric network.		
1.2. Floodplain zoning based on hazard and risk maps for all major basins	Floodplain zoning and hazard and risk maps for all major basins in Georgia for key climate-induced hazards (floods, landslides, mudflows, avalanches, hailstorms and droughts) will be based on the most appropriate modern technologies and methods and aligned with international and regional standards. Hazard maps are essential for the assessment of current and future hazard scenarios and the design of hazard management solutions that fully accounts for climate change considerations. This will include zoning of development activity away from high hazard areas to avoid damages to people, property and economic activity. In addition, the hazard maps will be used as the basis of the MHEWS. There is currently no definitive or accurate hazard mapping for Georgia. The strategic assessment of risk to population, to economic activity and to future development under conditions of climate change is a government priority in order to support and guide local municipalities to wisely and rationally manage risk exposure to acceptable levels. GCF resources will be used to develop hazard maps under current and climate change conditions for the entire project area (all of Georgia) and for all relevant natural hazards.	- Assessment team; - Field visits; - Vehicles; - Fuel; - Accommodation; - Per diem; - International supervisor(s)/advisor(s); - Data inputs; - Printing and production.	Input will include cost of local and international experts, travel-related costs, cost of international experts, various data inputs, GIS work, printing and production of reports and maps; project management Flood hazard and risk maps will be developed in line with EU Floods and Water Directives requirements. Landslide and mudflow hazard and risk maps will build on the approach used for the Rioni AF basin. Accurate digital elevation models (DEM) such as from LiDAR sources for all floodplains of Georgia for hazard modelling and mapping will be utilized. A comprehensive topographic survey of rivers through high risk areas will be undertaken. Historical hydro-meteorological and geological data for all Georgia required for all hazard and risk assessments will be digitised and systematised.
1.3 Introduction and implementation of methods and tools for the systematic gender-sensitive socio-economic vulnerability assessment for decision making	The tool will integrate various spatial socio-economic data with the hazard maps, and produce risk maps, which will include economic losses and damages and loss of life estimates. Hazard maps and underlying information will be used in combination with infrastructure (bridges, roads and buildings,	- Formalized methodology; - International expert; - Local experts; - Hazard maps, social-economic variables; - Field visits;	Inputs will include development of standardized methodology, cost of international expert and local consultants, input data, field visits and printing and production of vulnerability reports.

	hospitals, schools, power plants, critical infrastructure), land use (settlements, agriculture, grazing lands, and conservation areas), property and socio-economics data, to assess the socio-economic impacts of each hazard and produce economic vulnerability maps for the river basins. This risk map, based on the accurate hazard mapping of the current situation will form the baseline. Gender considerations will be mainstreamed in the analysis. It will be important to assess the macro-economic effects of hazards on the Nation's economy, its balance of payments and import/export parity. This activity will be implemented in close cooperation with SSCMC, which by mandate is tasked to carry out vulnerability studies and identify and prioritize risks. Other stakeholders and beneficiaries will include NEA, MIA, Ministry of Economy (for the evaluation of the mirco- and macro-economic impacts of hazards and cost-benefit mitigation measures); Ministry of Finance (for budget allocations for DRR and CCA activities to address hazard management); MoEPA (assessment of loss and damages to agriculture and the assessment of likely mitigation measures), and potentially the insurance industry in their assessment of premiums that should be associated with losses and damages of insurable assets.	- Production of vulnerability reports	This activity will build on the bespoke GIS-based socio-economic risk model[15] developed for Rioni AF basin. The developed model will be enhanced with improved datasets to be acquired/established by the project. Agricultural damage per unit of area will be calculated based on landuse, typical crop yields and current market values. The impact on livestock will be evaluated and valued at their local market value and their density across each region. The loss of dwellings will be valued based on the type of structure. The probability of the loss of life and injury will be valued based on the density of population and a hazard index (for instance for the flood hazard, this index will be calculated depending on the average flood depth and velocity). Costs for the rebuild of damaged major infrastructure will be included, as well as the costs for post-event aid relief, based on the historic records for previous events.
1.4 A centralized multi-hazard disaster risk information and knowledge system	The national multi-hazard information system to be developed under the GCF project will consist of a national e-Library, databases (including the GIS database previously noted), information systems and knowledge portal (web knowledge portal to increase awareness, provide interactive hazard maps, with integration with social media and possible mobile application to increase	- Data inputs; - Maps; - Literature; - IT/DB software; - IT specialist; - International advisor(s);	Inputs will include data and studies from previous activities and related literature, IT/DB software/programme, IT specialist(s), IT and communications technology, international expert(s). The hazard-related part of the meta-database will be hosted and maintained by NEA. The metadatabase with socio-economic parameters, including vulnerability and risk assessments will be hosted by MIA with the SSCMC having access to relevant data on disaster statistics, losses and damages and socio-economic vulnerability. Both

[15] Developing climate resilient flood and flash flood management practices to protect vulnerable communities of Georgia; Socio-economic assessment of flood risk in Rioni basin. UNDP/AF

	community engagement and allow two-way flow of information. It will be an integral part of the NSDI currently being developed for Georgia and provide the information access and sharing platform for geospatial information on hazards.	- Computer and communications technolog*ies*	metadatabases will be interconnected and integrated into existing EMA's GEOdata portal. Data access protocols for various concerned government agencies will be developed. The system will represent a major shift in how government departments currently work and will need to be supported by the introduction of appropriate data sharing protocols and importantly by extensive training and capacity building to ensure sustainability.
2.1: Institutional and legal frameworks and institutional capacity building for the MHEWS and for the enhanced use of climate information. Improved coordination and communication protocols for early warning	2.1.1. The project will strengthen policy, regulatory framework and technical guidance for MHEWS and climate risk management. In particular, the project will support development of framework legislation on floods management, corresponding by-laws and technical guidance informed by the EU Floods Directive. Similarly, technical guidance related to other types of hydrometeorological hazards will be developed. Technical regulations and guidance on EWS will be developed and supported. MHRA mandates and methodology will be finalized. Vulnerability assessment and CBA methods tested under the UNDP/AF Rioni project will be standardized and institutionalized. Nation-wide floodplain zoning policy based on risk and hazard maps (produced under activity 1.2) will be operationalized through relevant national regulations and guidance documents. 2.1.2. Institutional strengthening, coordination, communication and enhanced use of climate information: the project will help the government to clearly define major and minor hazards and set proper criteria for their distinction. Criteria for the definition of the different warning levels will be established. Clear communication lines between different agencies will be established, any duplication and inefficiencies will be eliminated. SOPs, Communication Protocols and Codes of Conduct will be developed for each of the agencies responsible for the various elements of the MHEWS and response. Roles of regional and local authorities will be clarified and detailed. National	- International and local expertise; - Consultations; - Workshops	Inputs will include international and local expertise, relevant literature, consultations and workshops and related costs, printing and production costs.

	operational maintenance procedures for hydrometric network will be established (NEA). 2.1.3. Training and capacity building of relevant stakeholders at all levels. The project will develop and implement training plans for each technical area of expertise related to climate-induced hazard risk assessment and management, including in the area of: • multi-hazard assessment, hydrometry, forecasting and modelling, EWSs; • agrometeorological monitoring; • vulnerability and risk assessments; • multi-hazard risk management (MHRM) and the use of climate information.		
2.2 Development and implementation of the MHEWS covering all basins in Georgia, building on the Rioni basin prototype and on the expanded hydrometric network to be achieved through activity 1.2.	In order to upscale the existing Rioni forecasting system towards a nation-wide MHEWS the following actions will be covered with the GCF financing: 2.2.1 Upgrade of flood forecasting - expanding meteorological and hydrological forecasting capacities. 2.2.2 Integration of the new sources of data/types of data into the forecasting platform. 2.2.3 Expanding the hydrological and hydraulic models within the forecasting platform to cover the whole territory of Georgia. 2.2.4 Development of drought forecasting. 2.2.5 Development of landslide forecasting. 2.2.6 Development of avalanches forecasting 2.2.7 Development of wind forecasting 2.2.8 Development of hailstorm forecasting	- Equipment and software specification; -Tender; - Procurement; - Installation; - International and local expertise; -Technicians for installation; - Supervision of works	Inputs will include development of specs, tender dossier, procurement, installation, assistance from international and local experts, supervision of works The expanded hydrological and hydraulic models for enhanced nation-wide flood forecasting will require the following inputs: (i) A high resolution Digital Elevation Model (DEM) (ii) Provision of the access to the European Centre for Medium-Range Weather Forecasts data. (iii) A new integrated data management system (iv) Expanded input data sources (v) Forecasting Data Management System (vi) Forecast Verification System Development of drought, landslide, avalanches, wind and hailstorm forecasting will require the following elements: (i) Design of the forecasting system (ii) Historical information (iii) Product development (iv) Development of warning criteria In order to ensure that the whole MHEWS is implemented successfully, the following additional system capacities will be secured: additional hydraulic modelling software, additional servers and storage capacity, additional internet capacity, additional redundant back up system

	2.2.9 Development of general forecasting capabilities and MHEWS 2.2.10 Design and implementation of the "Last-Mile" warning dissemination and communication system. 2.2.11. Design and implementation of the National MHEWS Protocol 2.2.12. Monitoring and evaluation of the designed MHEWS and development of recommendations for the system enhancements, expansion and further development (in the last year of the GCF project implementation).		
2.3. Enhancing access and the use of weather and climate information and agrometeorological information services by farmers and agricultural enterprises	This activity will build upon the enhanced equipment and capacities of the agrometeorological observation network to be achieved through the Output 1. The project will support capacities of the national agricultural agencies and extension services to generate and deliver tailored climate and weather information and advice to the farmers. The project will bring ICT-based innovations into the communication of forecasts and advisories; improve the use of historical data and derivations; improve medium and short range weather forecasts and longer term predictions for agriculture (seasonal, decadal etc.). This will also include partnerships with the private sector through the partnerships with the internet providers or mobile companies that are willing to design such new products in collaboration with NFA, agribusinesses, farmers' groups and other clients to deliver timely forecasts and advisories to the 700,000 farmers.	- Assessment and development of products; - Printing and production - International and national expertise; - Consultations, meetings	Inputs will include costs of international and national expertise, assessment, printing and production, consultations, meetings. Specific actions will include: 2.3.1. Capacity building and training for the MoEPA. 2.3.2. Integrating climate risk and adaptation priorities into the agriculture sector plans, investments and budget frameworks. 2.3.3. Development of guidance documents, methodologies and technical regulations for the agricultural sector on climate risk assessment and management and the use of climate information. 2.3.4. Development of new climate information products for the agricultural sector (agri-climate maps, calendars, advisories, etc.) and delivery of these products to the farmers. 2.3.5. Supporting improvement of agrometeorological advisory services through the NFA, its regional service centres, the Scientific-Research Center of the MoEPA and its information-consultation centers.
2.4 MHRM planning platforms: Basin-level multi-hazard risk management plans; Municipal-level multi-hazard response and preparedness plans	2.4.1. Multi-hazard Basin Risk Management Plans for all 11 major river basin in Georgia. These plans will take a bottom-up, multi-stakeholder approach. The MHRM plans will be integrated into the broader river basin management plans developed by the MoEPA. Based on the risk management plans, the project will finance	- Local experts teams/companies; - International experts; - Travel; - Data inputs; - Stakeholder consultation; - Assessments;	Inputs will include assessments by local and international experts, travels to the fields, input data, stakeholder consultations, printing and production costs. The design of the river basin multi-hazard risk management plans will include broadly: • Hazard and risk profiles • Socio-economic vulnerability • A costed and prioritised list of options and activities based on the CBA

	feasibility studies/design for the priority risk reduction options in order to inform and accelerate risk reduction investments. Up-to five priority structural projects will be supported with the feasibility/design work, including at least one flood defense project for the Tbilisi Municipality defined under the 2015 Tbilisi PDNA. 2.4.2. Municipal-level multi-hazard response and preparedness plans will be developed for 11 high-risk municipalities, including the Tbilisi Municipality. The work in Tbilisi will be integrated into the resilience planning under the 100 Resilient Cities initiative. Tbilisi is the capital city with high concentration of the population (around 1.3 million people), assets and infrastructure. The low adaptive capacities and high vulnerability of the city were demonstrated during the 2015 multi-hazard event that resulted in human losses, significant damages and destruction of critical infrastructure. Through the enhanced planning and capacity building for the City of Tbilisi the GCF project will outreach and enhance resilience of one third of the Georgian population.	- Printing and production.	• An action programme based on packaging of the options • An Action Plan risk log • Preliminary design and a detailed description of each option including the assumptions used in deriving costs
3.1 Implementation of community-based early warning schemes and community-based climate risk management (CBCRM).	Community-based EWS and CBCRM schemes will be implemented in 100 high risk communities across Georgia based on full community engagement and participation. 3.1.1. Implementation of CBEWS to complement the fully integrated national EWS. Communities will be chosen based on relatively high risk, short lead time of the extreme events, potential technical constraints for the central system to effectively service the community (e.g. due to remote location or connection problems). For this activity, the project will work with smaller high-risk communities/settlements with the population of up to 7000 people. For mountainous communities upstream that are affected by short lead time events (up-to 100	- Detailed specs for equipment, tender dossier, procurement; - Water level gauges, sirens, loud speakers; - Other IT and telecommunications equipment; - Installation; - Field visits and oversights of installation works; - Stakeholder consultations; - International expert; - Local expertise/companies - GIS mapping; - Printing and production.	Inputs for the CB EWS will include development of detailed specifications for equipment, tender dossier, announcement and procurement and installation, supervision of installation costs, travel, international and local experts work. The following specific equipment inputs will be delivered: • Monitoring devices: water level monitoring sensors (100); staff gauges (200) • Communication tools: GSM/GPRS modem device (2); dedicated web-site; generators (200); sirens (200); remote siren system (1); boards (200) • Response tools: Evacuation routes signaling (200); fitting of the local evacuation centres (70). The following specific actions will be supported: • Consultations with local authorities and community leaders • Refinement of estimates for the numbers and locations of households at risk • Identifying vulnerable groups • Develop warning and evacuation maps

	communities) the project will provide at least one telemetered raingauge in the headwaters to provide backup and additional information at a national and district level (unless there are opportunities to share gauges between schemes) and with communication equipment. The downstream communities may not require additional local monitoring equipment (as the national EWS will be capable of providing timely warnings) but will be equipped with the warning communication tools (up-to 200 communities). 3.1.2. Implementation of Community-based Climate Risk Management: local communities will be trained to plan, implement and maintain non-structural intervention measures necessary to reduce various climate-induced risks. Participatory community-based adaptation interventions will be planned and implemented in priority risk areas e.g. establishing locally controlled and managed flood zones; erection of visual flood zone demarcation posts at strategic locations; watershed rehabilitation works such as construction of natural small scale defenses with community involvement. The project will build implementation capacities of local communities and support implementation of the prioritized measures based on communities' ownership and co-financing. Gender mainstreaming will be a key aspect of the CBCRM process. This set of actions will be implemented in partnership with local NGOs and COBs with strong grass-roots experience.		• Placement of markers and signs linked to alert levels • Advice on procurement and installation of telemetered radar level gauges and rain gauges • Developing warning thresholds appropriate to each community (or group of communities) • Ensuring that central observations and forecasts are available at district and community level and that training is provided on how to interpret the information • Establishing procedures for monitoring and evaluation • Developing a community-specific engagement programme • Development of simple forecasting tools for use at district and community level • Designing a standard set of warning messages, codes, icons • Preparing a guidance note on the level of technical support to be provided at government level • Developing mechanisms for local staff to communicate information on rainfall and river levels and flood conditions to national and district level • Establishing a volunteer observer or 'spotter' training and recruitment programme Inputs for the CBCRM work will include assessments, stakeholder mobilization and engagement by local experts teams, travel and related costs, input data, GIS mapping, printing and production. The CBCRM work will involve: • identification and mobilization of various interest groups in target communities; • participatory risk assessment; • design of community risk reduction interventions measures, including monitoring and evaluation framework; • development of community resilience plans; • support to implementation.
3.2 Public awareness and capacity building programme at all levels to effectively deliver climate risk information and training to communities and	The GCF project will assist the government of Georgia in shifting from add-hoc project based awareness and education efforts to a planned, consistent and sustainable national-led information and communication system for enhanced climate and disaster risk management. The	- Local experts/companies; - Development of education and awareness materials; - Trainings and workshops; - Media products;	Inputs will include development and implementation of awareness and outreach campaigns by individual experts and organizations, trainings and workshops, travel, production of education, awareness and media products, media coverage, competitions, audio-visual equipment. This activity will be led by the EIEC under the MoEPA that has a mandate as well as experience

local first-responders	following indicative actions will be carried: 3.2.1. Capacity building to the EIEC 3.2.2. Capacity building at central, municipal and community levels 3.2.3. Networking and advocacy on MHRM and CBEWSs 3.2.4. Youth awareness programmes in MHRM 3.2.5. Nation-wide media campaign on gender-responsive MHRM and EWS	- Media coverage; - Audio-visual equipment.	in environmental outreach, education and capacity building. National and municipal level response trainings for officials will be carried out through cooperation of the EIEC and EMA. Community level awareness raising and informal education activities will be carried out in close cooperation with NGOs having grassroots capacity building experience and information.
3.3 Implementation of risk reduction interventions that would significantly reduce the risks against which the MHEWS will operate	This project will implement 13 flood risk reduction interventions for areas where risk from climate-induced natural hazards is highest based on the assessments conducted under the Rioni project. As a result of technical studies, stakeholder consultations and CBA, 13 sites have been short-listed for the GCF investment. A social and environmental assessment was conducted for the selected sites/measures, Social and Environmental Management Framework was developed, commitments for the Operational and Maintenance costs were secured. The activity is co-financed by the MRDI	- Detailed specs; - ToRs; - Bills of Quantities; - Tender Dossier; - Construction works; - Procurement of construction and/or engineering work; - Supervision of construction works; - Local experts/engineering companies; - Construction companies; - Travel; - Project management.	Inputs will include development of detailed specifications, bills of quantities, ToRs, tender dossier, procurement, construction works and supervision of construction works; costs of local experts/companies, travel, printing and production. The types of flood protection structures to be erected: • Embankments with rock boulder • Wire mesh mat lining • Concrete regulation wall • Wire mash gabion wall • Climate proofing water regulation facility • Canal widening and lining • Riverbed and channel cleaning

H.2. Arrangements for Monitoring, Reporting and Evaluation

218. GCF funding will be used to ensure that monitoring and evaluation systems are put in place to track progress over the 7 years of project implementation towards the planned project outcomes and fund level impacts. This will be achieved through the means of verification outlined in Table H.1.2 above, where progress on each indicator from the baseline to the end-point targets for those indicators will be tracked. Additionally, through the results framework outlined in tables 1.1 and 1.2 the project impact will be assessed using the following 6 domains of impact:

- Impact on physical and financial assets
- Impact on Social Capital, Empowerment and change of behavior
- Impact on Food Security
- Environmental Impact
- Impact on Institutions, policies, and the regulatory framework
- Impact on Gender

219. An iterative systematic gender-sensitive socio-economic vulnerability assessment (SVA) will be introduced through the Output 1, Activity 1.3. as a tool to measure and monitor change in socio-economic vulnerability of Georgian communities. The SVA tool piloted through the Rioni project will rely on a combination of census data, socio-economic parameters and field surveys. Initially, through the integration of hazard maps and maps of infrastructure (bridges, roads and buildings, hospitals, schools, power plants, critical infrastructure), land use (settlements, agriculture, grazing lands, and conservation areas), property and socio-economics data, the project will produce economic vulnerability maps for the

river basins and establish baseline risk. The tool will be further used to monitor changes in vulnerability and risks from multiple hazards at municipal and national level.

220. Further, under the Output 2, activity 2.2. the project will carry out monitoring and evaluation of the designed MHEWS and development of recommendations for the system enhancements, expansion and further development (in the last year of the GCF project implementation). Under the same technical Output 2, activity 2.1 change in institutional capacities to implement MHEWS and manage climate information will be measured through the integrated institutional capacity assessment scorecard. Institutional capacity assessment will be conducted in the Years 1, 4 and 7 of the project. Key agencies to be included in the institutional capacity assessment include but not limited to MoEPA/NEA, NFA, MIA, EMA. Monitoring, evaluation and risk tracking will be integrated into the climate-informed multi hazard basin risk management planning and in the municipal MHRM response and preparedness plans (Activity 2.4).

221. In order to examine the impacts of the project on rural communities, the review will examine whether the interventions implemented by the project have enhanced the value and derived benefits from existing community assets such as land, water, livestock and livelihoods. Impact on income generation and improvement in livelihoods will be key direct benefits to be examined while improved skill or health, education, and socio-economic conditions will be key indirect benefits to be examined. Impact on increased capacity of local communities to exploit potential economic opportunities and to develop stronger link with the markets and external partners, through the risk reduction and adaptation interventions provided by the project, will be examined. Efforts to strengthen local level organizations in the implementation of similar projects in the future will be a key impact as this will reflect whether the project has built local capacity to implement and use these new climate resilient measures in the long-term. Likely contribution of the project to food security will be examined. Key elements of food security is availability (production and trade), access (income, markets and prices) and stability (storage and other marketing arrangement at household and local level.

222. Environmental degradation very often contributes to non-resilience to climate change and increased risk from climate-related disasters. The extent to which the project contributes to rehabilitation of the environment (particularly of the agricultural resource base and watershed management) in areas currently affected by land degradation and at high risk of hazards, is strongly associated with poverty impact. This domain concentrates on the local level environmental impacts of the project, as well as any environmental consequences of the project. It is also concerned especially with those environmental aspects, which are under the control of, or are influenced by, the rural communities. Environmental impacts may be negative as well as positive intended or unintended and all of these will be examined.

223. Existing institutions, policies and regulatory frameworks significantly influence the lives and resilience of the rural poor. This encompasses the change brought about in sectoral and national policies affecting exposure of local communities to hydrometeorological hazards. In addition, the degree to which the project impacts local-level decision making capacity, is also a relevant consideration and important to this project. Hence the effectiveness of the 'last mile' component of the EWS and particularly the CBEWS will be closely assessed. The review will examine the extent to which a contribution has been made to improving the national, and particularly local institutions to implement, and manage CBEWS and CBDRM which affects the lives and livelihoods of rural communities.

224. To monitor and measure the changes brought by the project, impact evaluation will be designed to assist the project team to collect baseline information/data, final survey to gain insights into developmental and adaptive impact of the interventions that will be carried out during the project. For this purpose, before any interventions take place, a robust baseline survey needs to be administered. During the project, it is expected follow-up surveys and final large survey will also be carried out at end of project. The impact of the project will be assessed by undertaking the following:

- A household survey targeting beneficiary households at least two times (baseline and final) during the project implementation;
- Analysis of the survey data;
- Follow-up survey which will be used by project staff; and

- Training of project staff on the follow-up survey methodology.

225. The impact indicators will include but should not be limited to: (i) extent to which structural measures and non-structural measures have reduced exposure to hazards (e.g. whether frequency of flooding has reduced etc.) (ii) changes in income from agriculture and related activities (changes in income should take into account the level of home consumption); (iii) yield from agricultural production for key produce; (iv) yield of home gardens; (y) migration for seasonal work; (vi) farm land left fallowed; (vii) freshwater availability for household use; (viii) change in family savings.

226. As part of the community survey a section will be included to monitor community involvement in the design and implementation of community-based EWS and CRM plans – tracking participation in paid work opportunities, as well as ongoing involvement in resilience building through in-kind commitment of time to maintenance and enforcement activities. This will include respondents' estimation of approximate number of hours per month spent on local resilience building actions, as part of the project Activity 3.1. Comprehensive capacity and awareness building to foster such engagement will be carried out by the project under Activity 3.2. All community capacity building, training and awareness activities will be accompanied with feedback collection/result monitoring tools. Finally, monitoring over the implementation and results of site specific structural protection measures at 13 sites will be ensures as outlined in the SEMF.

227. Since the project impacts from many of the interventions are likely to be realized close to the end and after the project implementation, the impact evaluation methodology and tools will be embedded within responsible agencies to monitor in the long-term, thus ensuring regular surveying of the key impact and development indicators required for long-term assessment of project impact.

228. Project monitoring and evaluation will be undertaken in compliance with the UNDP POPP, the UNDP Evaluation Policy.

Oversight and monitoring responsibilities:

229. **National Project Manager**: The NPM is responsible for day-to-day project management and regular monitoring of project results and risks, including social and environmental risks. The NPM will ensure that all project staff maintain a high level of transparency, responsibility and accountability in M&E and reporting of project results. The Project Manager will inform the Project Board, the UNDP Country Office and the UNDP-GEF Regional Technical Advisor of any delays or difficulties as they arise during implementation so that appropriate support and corrective measures can be adopted.

230. The NPM will develop annual work plans to support the efficient implementation of the project. The NPM will ensure that the standard UNDP and GCF M&E requirements are fulfilled to the highest quality. This includes, but is not limited to, ensuring the results framework indicators are monitored annually in time for evidence-based reporting in the Annual Project Report, and that the monitoring of risks and the various plans/strategies developed to support project implementation (e.g. Environmental and social management plan, gender action plan etc..) occur on a regular basis.

231. **Project Board:** The Project Board will take corrective action as needed to ensure the project achieves the desired results. The Project Board will hold project reviews to assess the performance of the project and appraise the Annual Work Plan for the following year. In the project's final year, the Project Board will hold an end-of-project review to capture lessons learned and discuss opportunities for scaling up and to highlight project results and lessons learned with relevant audiences. This final review meeting will also discuss the findings outlined in the project terminal evaluation report and the management response.

232. **Project Implementing Partner:** The Implementing Partner is responsible for providing all required information and data necessary for timely, comprehensive and evidence-based project reporting, including results and financial data, as necessary and appropriate. The Implementing Partner will strive to ensure project-level M&E is undertaken by national institutes, and is aligned with national systems so that the data used by and generated by the project supports national systems.

233. **UNDP Country Office:** The UNDP Country Office in ~~Cairo~~Georgia will support the NPM as needed, including through annual supervision missions. The annual supervision missions will take place per the schedule outlined in the annual work plan. Supervision mission reports will be circulated to the project team and Project Board within one month of the mission. The UNDP Country Office will initiate and organize key M&E activities including the Annual Project Report, the independent mid-term review and the independent terminal evaluation. The UNDP Country Office will also ensure that the standard UNDP and GCF M&E requirements are fulfilled to the highest quality.

234. The UNDP Country Office is responsible for complying with all UNDP project-level M&E requirements as outlined in the UNDP POPP. This includes ensuring the UNDP Quality Assurance Assessment during implementation is undertaken annually; the regular updating of the ATLAS risk log; and, the updating of the UNDP gender marker on an annual basis based on gender mainstreaming progress reported in the Annual Project Report and the UNDP ROAR. Any quality concerns flagged during these M&E activities (e.g. Annual Project Report quality assessment ratings) must be addressed by the UNDP Country Office and the Project Manager.

235. The UNDP Country Office will support GCF staff (or their designate) during any missions undertaken in the country, and support any ad-hoc checks or ex post evaluations that may be required by the GCF.

236. The UNDP Country Office will retain all project records for this project for up to seven years after project financial closure to support any ex-post reviews and evaluations undertaken by the UNDP Independent Evaluation Office (IEO) and/or the GCF.

237. **UNDP-Global Environmental Finance Unit (UNDP-GEF):** Additional M&E and implementation oversight, quality assurance and troubleshooting support will be provided by the UNDP-GEF Regional Technical Advisor and the UNDP-GEF Directorate as outlined in the management arrangement section above.

238. A project inception workshop will be held after the UNDP project document has been signed by all relevant parties to: (a) re-orient project stakeholders to the project strategy and discuss any changes in the overall context that influence project implementation; (b) discuss the roles and responsibilities of the project team, including reporting and communication lines and conflict resolution mechanisms; (c) review the results framework and discuss reporting, monitoring and evaluation roles and responsibilities and finalize the M&E plan; (d) review financial reporting procedures and mandatory requirements, and agree on the arrangements for the annual audit; (e) plan and schedule Project Board meetings and finalize the first year annual work plan. The Project Manager will prepare the inception report no later than one month after the inception workshop. The final inception report will be cleared by the UNDP Country Office and the UNDP Regional Technical Adviser, and will be approved by the Project Board.

239. The Project Manager under the guidance of the CTA, the UNDP Country Office, and the UNDP Regional Technical Advisor will provide objective input to the annual Project Implementation Report (PIR) for each year of project implementation. The Project Manager will ensure that the indicators included in the project results framework are monitored annually well in advance of the PIR submission deadline and will objectively report progress in the Development Objective tab of the PIR. The annual PIR will be shared with the project board and other stakeholders. The UNDP Country Office will coordinate the input of the NDA Focal Point and other stakeholders to the PIR. The quality rating of the previous year's PIR will be used to inform the preparation of the next PIR. The final project PIR along with the terminal evaluation report and corresponding management response will serve as the final project report package.

240. An independent mid-term evaluation will be undertaken within fourth quarter of the third year of project implementation. Findings and responses outlined in the management responses will be taken unto consideration as corrective measures or measures to enhance the project results during planning and implementing activities for upcoming three-year period. The terms of reference, evaluation process and the final MTE report will follow the standard templates and guidance available on the UNDP Evaluation Resource Center. The final MTE report will be cleared by the UNDP Country Office and the UNDP Regional Technical Adviser, and will be approved by the Project Board. The final MTE report will be available in both English and Georgian languages.

Additional GCF evaluation requirements:

241. An independent terminal evaluation (TE) will take place no later than three months prior to completion of the project. The terms of reference, the review process and the final TE report will follow the standard templates and guidance available on the UNDP Evaluation Resource Center. The final TE report will be cleared by the UNDP Country Office and the UNDP Regional Technical Adviser, and will be approved by the Project Board. The TE report will be available in English.

242. The UNDP Country Office will include the planned project terminal evaluation in the UNDP Country Office evaluation plan, and will upload the final terminal evaluation report in English and the management response to the public UNDP Evaluation Resource Centre (ERC) (http://erc.undp.org). Once uploaded to the ERC, the UNDP Independent Evaluation Office will undertake a quality assessment and validate the findings and ratings in the TE report, and rate the quality of the TE report.

243. The UNDP Country Office will retain all M&E records for this project for up to seven years after project financial closure in order to support ex-post evaluations.

244. A detailed M&E budget, monitoring plan and evaluation plan will be included in the UNDP project document.

245. UNDP will perform monitoring and reporting throughout the reporting period in accordance with the AMA and Funded Activity Agreement (FAA). UNDP has country presence and capacity to perform such functions. In the event of any additional post-implementation obligations over and above the AMA, UNDP will discuss and agree these with the GCF Secretariat in the final year of the project and will prepare a post-implementation monitoring plan and budget for approval by the GCF Board as necessary.

I. SUPPORTING DOCUMENTS FOR FUNDING PROPOSAL

☒ NDA No-objection Letter **Annex I**

☒ Feasibility Study **Annex II**

☐ Integrated Financial Model that provides sensitivity analysis of critical elements (xls format, if applicable) – **Not applicable for this project**

☒ Letters of co-financing **Annex IV**

☒ Term Sheet (including cost/budget breakdown, disbursement schedule, etc.) – **Annex V**

☒ Social and Environmental Screening Report **Annex VI a**

☒ Environmental and Social Management Framework **Annex VI b**

☒ Appraisal Report: Minutes from the pre-LPAC meeting **Annex VII** Appraisal Report or Due Diligence Report with recommendations (If applicable)

☒ Evaluation Report of the baseline project **Annex VIII**

☒ Map indicating the location of the project/programme **Annex IX**

☒ Timetable of project/programme implementation **Annex X**

☒ Project/Programme Confirmation **Annex XI**

Additional information

☒ Economic Analysis (narrative report) **Annex XII a**

☒ Economic Analysis (excel spreadsheet) **Annex XII b**

☒ detailed CBA for structural measures **Annex XII c**

☒ Additional Background Details **Annex XIII**

- Procurement Plan **Annex XIII a**
- O&M Plan **Annex XIII b**
- Gender Assessment, Plan and Budget **Annex XIII c**
- Stakeholder Consultations **Annex XIII d**
- Stakeholder Engagement Plan **Annex XIII e**
- Evidence of internal approval **Annex XIII f**
- Project Budget – GCF form **Annex XIII g**
- HACT assessments - **Annex XIII h**
- Environmental and social report(s) disclosure **Annex XIII i**

☒ Responses to GCF comments on Funding Proposal **Annex XIV**

☒ Letter of Endorsement from UNDP Senior Management **Annex XV**

** 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

საქართველოს გარემოსა და ბუნებრივი რესურსების დაცვის სამინისტრო
MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES PROTECTION OF GEORGIA

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 # 9907 **25 / November / 2016**

To: Green Climate Fund

Re: Funding proposal for the GCF by the United Nations Development Programme (UNDP) on Scaling-up Multi-Hazard Early Warning System in Georgia to increase community resilience to climate-induced disasters.

Dear Madam, Sir,

We refer to the project "Scaling-up Multi-Hazard Early Warning System in Georgia to increase community resilience to climate-induced disasters" (project) as included in the funding proposal submitted by the UNDP to us on 20 November 2016.

The undersigned is the duly authorized representative of the Georgia Ministry of Environment and Natural Resources Protection, the National Designated Authority/focal point of Georgia.

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 Georgia 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 country'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 acknowledge that this letter will be made publicly available on the GCF website.

Kind regards

First Deputy Minister Teimuraz Murgulia

Environmental and social report(s) disclosure

Basic project/programme information	
Project/programme title	Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia
Accredited entity	UNDP
Environmental and social safeguards (ESS) category	Category B

Environmental and Social Impact Assessment (ESIA) (if applicable)	
Date of disclosure on accredited entity's website	2018-01-25
Language(s) of disclosure	English, Georgian
Link to disclosure	English: http://www.ge.undp.org/content/georgia/en/home/library/environment_energy/environment-and-social-assessment-report/ Georgian: http://www.ge.undp.org/content/georgia/ka/home/library/environment_energy/environment-and-social-assessment-report.html A simplified ESIA consistent with the requirements for a category B project is contained in the Environmental and Social Assessment Report.
Other link(s)	http://
Environmental and Social Management Plan (ESMP) (if applicable)	
Date of disclosure on accredited entity's website	2018-01-25
Language(s) of disclosure	English, Georgian
Link to disclosure	English: http://www.ge.undp.org/content/georgia/en/home/library/environment_energy/environment-and-social-assessment-report/ Georgian: http://www.ge.undp.org/content/georgia/ka/home/library/environment_energy/environment-and-social-assessment-report.html An ESMP consistent with the requirements for a category B project is contained in the Environmental and Social Assessment Report.
Other link(s)	http://
Resettlement Action Plan (RAP) (if applicable)	
Date of disclosure on accredited entity's website	Not applicable
Any other relevant ESS reports and/or disclosures (if applicable)	
Description of report/disclosure	Not applicable