

I COMPARATIVE ANALYSIS OF CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION ARCHITECTURE AND RECOMMENDED ACTIONS

Road Map



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**Swiss Agency for Development
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Resilient nations.*

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Acronyms and Abbreviations

AAR	Adjara Autonomous Republic
ADB	Asian Development Bank
AF	Adaptation Fund
AHS	Automated Hydrological Station
ALCP	Alliances Lesser Caucasus Programme
ARCC	Agricultural Research and Consultation Centre
ASB	Arbeiter-Samariter-Bund
ASL	Above Sea Level
ASS	Georgian Samaritan Association
AWS	Automated Weather Station
BDD	Basic Data and Directions
BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
BS	Bachelor of Science
BSME-FFG	Black Sea and Middle East Flash Flood Guidance (BSMEFFG) System
BUR	Biennial Update Report
°C	Celsius degree
CADRI	Capacity for Disaster Reduction Initiative
CBMHEWS	Community-based multi-hazard early warning system
CBMHRM	Community-based multi-hazard risk management
CC	Climate Change
CCA	Climate Change Adaptation
CCD	Climate Change Division
CCM	Climate Change Mitigation
CCNH	Centre for Control of Natural Hazards
CCTV	Closed-circuit television (also known as video surveillance)
CENN	Caucasus Environmental NGO Network
CEF	Climate Forum East
CIS	Commonwealth of Independent States
CLIDATA	archiving software for climatological data
CMF	Caucasus Mountain Forum
CMS	Composite of Multiple Signals
CNF	Caucasus Nature Fund
COP	Conference of Parties
CORS	Continuously Operating Reference Station
CRM	Climate Risk Management
CSA	Climate Smart Agriculture
CSO	Civil Society Organization
CZDA	Czech Development Agency
DELFT-FEWS	open data handling platform/software developed by Deltares as a hydrological forecasting and warning system
DEM	Digital Elevation Model
DIPECHO	EU Disaster Preparedness Programme
DMCT	UN Disaster Management Coordination Team
DoECC	Department of Environment and Climate Change
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction

EC	European Commission
ECDD	Environment and Climate Change Division
ECMWF	European Centre for Medium-Range Weather Forecasts
ED	Environment and Development, Georgian NGO
EEC	European Economic Community
EIA	Environmental Impact Assessment
EIB	European International Bank
EIEC	Environmental Information and Education Centre
EMA	Emergency Management Agency
EMS	Emergency Management Service
ENPARD	European neighbourhood programme for agriculture and rural development
ENPI	European Neighbourhood and Partnership Instrument
EU	European Union
EUAA	EU Georgia Association Agreement (full title: ASSOCIATION AGREEMENT between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Georgia, of the other part)
EUD	EU Delegation to Georgia
EWS	Early Warning System
FAO	Food and Agriculture Organization
FD0	Number of frosty days (extreme weather index)
FCCC	Framework Convention on Climate Change
FEWS	Flood Early Warning System
FNC	Fourth National Communication
FTP	File Transfer Protocol
GCAA	Georgian Civil Aviation Agency
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEL	Georgian Lari
GEO	Georgia's Environmental Outlook, Georgian NGO
GEO	Group on Earth Observations
GEOSS	GEO System of Systems
GEO CORS	Georgian Continuously Operating Reference Station
G4G	Governance for Growth (USAID Economic Development Programme)
GFA	Gesellschaft für Agrarprojekte in Übersee (Society for agricultural projects, overseas)
GFS	Global Forecast System
GIS	Geographic Information System
GiZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
GNSS	Global Navigation Satellite System
GoG	Government of Georgia
GPRS	General Packet Radio Service
GRF	The Governance Reform Fund
GRCS	Georgian Red Cross Society
GSHS	Georgian State Hydrographic Service
GSM	Global System for Mobile communications
GTU	Georgian Technical University
HEC-HMS	Hydrological modeling system of the Hydrological Engineering Centre
HCT	Humanitarian Coordination Team
HR	Human resources

HRM	Hydrological Research Model
HTTP	Hypertext Transfer Protocol
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
ICRC	International Committee of the Red Cross
ID0	Frosty days index
IDPs	Internally Displaced Persons
IFAD	International Fund for Agriculture Development
IHO	International Hydrographic Services
INDC	Intended Nationally Determined Contribution
INSPIRE	Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community
IP	Internet Protocol
IR50	Tropical thunderstorm index (number of days with more than 50 mm precipitation)
JOC	Joint Operational Centre
KfW	Entwicklungsbank (German Development Bank)
km	Kilometre
km²	Square kilometre
LAM	Limited area model
LAN	Local Area Network
LEPL	Legal Entity of Public Law
LG	local government
LMD	Land Management Division
L-SLM	Landscape and Sustainable Land Management
Ltd	Limited liability
m	metre
mm	millimetre
m²	square metre
m³	cubic metre
MDF	Municipal Development Fund
MoEPA	Ministry of Environmental Protection and Agriculture
MoESCS	Ministry of Education, Science, Culture and Sports
MoESD	Ministry of Economy and Sustainable Development
MHEWS	Multi-hazard early warning system
MIA	Ministry of Internal Affairs
MIKE	Floodcomputer program that simulates inundation for rivers, flood plains and urban drainage systems.
MRDI	Ministry of Regional Development and Infrastructure
MS	Master of Science
MWS	Manual Weather Station
NALAG	National Association of Local Authorities of Georgia
NAP	National Adaptation Plan
NAPA	National Adaptation Program of Action
NAPR	National Agency for Public Registry
NC	National Communication
NCMC	National Crisis Management Centre
NDC	Nationally Determined Contribution
NEAP	National Environmental Action Programme
NEA	National Environmental Agency
NEMIS	National Emergency Management Information System

NFA	National Food Agency
NGO	Non-Governmental Organization
NVE	Norwegian Water Resources and Energy Directorate
OCMC	Operation Control/Management Centre
OPMET	Operational aeronautical meteorological data
QA/QC	Quality Assurance/Quality Control
PCPM	Polish Centre for International Aid
PDNA	Post-Disaster Need Assessment
PIF	Project Identification Form
PPRD	Prevention, Preparedness and Response to Natural and Man-made Disasters in the Eastern Partnership Countries
RC/HC	Resident Coordinator/Humanitarian Coordinator (of UNDP)
RDFG	Association Rural Development for Future Georgia
RECC	Regional Environmental Centre of Caucasus
RETIM 2000	part of World Meteorological Organization's Global Telecommunication System
RS	Remote Sensing
RTMC pro	Real-Time Monitor and Control Software, Professional Version
SDC	Swiss Development Cooperation Agency
SDG	Sustainable Development Goal
SIDA	Swedish International Development Agency
SISCO	Security Identification Systems Corporation
SNC-mt	Scientific Network for the Caucasus Mountain Region
SNC	Second National Communication
SOLAS	International Convention for the Safety of Life at Sea
SOP	Standard Operating Procedure
SSCMC	State Security and Crisis Management Council
SSH	Secure Shell (cryptographic network protocol for operating network services securely over an unsecured network)
SU25	Number of hot days index
TNC	Third National Communication
TSU	Tbilisi State University
TR20	Tropical nights index
TV	Television
UN	United Nations
UNECE	The United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNDP	United Nations Development Programme
USA	United States of America
USAID	United States Agency for International Development
WAN	Wide Area Network
WB	World Bank
WG	Working Group
WinZPV	complex information system used by the Czech Hydrological Institute to record river water measurements
WMO	World Meteorological Organization
WMS	Web Map Service
WRF model	Weather Research and Forecasting Model

Executive Summary

The report: “Comparative analysis of the climate change adaptation and disaster risk reduction architecture in Georgia and recommended actions (road map)” was prepared under the inception phase of the project: “Strengthening the Climate Adaptation Capacities in Georgia” implemented by the UNDP Country Office in Georgia with financial support from the Swiss Agency for Development and Cooperation (SDC). It is a baseline assessment with a primary objective to collect the missing scientific, technical and statistical data necessary to inform and enrich existing capacities, while identifying the current gaps, challenges and setup for disaster risk reduction/management (DRR/DRM) and climate change adaptation (CCA) in the country, both on national and local levels, with comprehensive analytical information.

The report consists of the following sections:

- /// Stakeholder analysis of CCA/DRR systems in Georgia;
- /// Capacity gap and comparative analysis of existing systems, practices and capacities in the area of climate change adaptation and disaster risk reduction against obligations of international agreements, national statutory and policy requirements; and
- /// Conclusions and recommended actions (road map) for enhancing CCA/DRR capacities as per identified capacity gaps and needs.

The given assessment only addresses mandates and capacities of stakeholders engaged in managing/reducing the risk of climate-induced disasters relevant to Georgia, such as: floods, flash floods, mudflows, rockfalls, avalanches, strong winds, hail events, droughts, etc. Furthermore, the study reviews and analyses the situation at central, regional and local level except for the Adjara Autonomous Republic, which is covered by another consultancy assignment commissioned by the UNDP Inception phase project funded by SDC independently from this report.

The report was developed by applying the following methodology:

- /// conducting of a desk review of international agreements in the area of CCA/DRR, the legal-regulatory basis in the area of CCA/DRR, policy/strategic documents in the area of CCA/DRR, previously prepared studies/reports related to the relevant current institutional setting in the area of DRR/CAA;

- /// vis-à-vis semi-structured interviews with the representatives of key stakeholders at the central level;
- /// conducting of a qualitative survey of local municipalities based on a specially elaborated questionnaire for local municipalities;
- /// conducting of a stakeholder consultation; and
- /// preparation of a comparative analysis of existing CCA/DRR norms, practices and institutional capacities against international commitments and national requirements and identification of gaps.

The following limitations were noted during the assessment:

- /// there are missing data on the CCA/DRR situation for some of the regions, including Kvemo Kartli, Imereti and Kakheti regions (more detailed information is given in the narrative part of the report);
- /// the poor quality of information contained in filled in and submitted questionnaires: inconsistency, incompleteness and misunderstanding of questions; and
- /// absent clear internal structure of some of the critical DRR institutions, e.g. Emergency Management Service, etc. that have recently undergone institutional changes

Key Stakeholders and their functions

The stakeholder analysis section of the study takes stock of existing CCA/DRR legal-regulatory and policy frameworks and institutions engaged in CCA/DRR, including government entities, academic and research institutions, Civic Society Organizations (CSOs) at national and local level, and donors active in the given area. It focusses on functions/mandates, organizational setting and present capacities of institutions related to all aspects of CCA/DRR, including:

- /// CCA/DRR governance – reporting under international agreements and development and implementation of legal-regulatory, policy and planning frameworks;
- /// Building climate-induced hazard and risk knowledge;
- /// Climate-induced disaster preparedness - disaster risk prevention/mitigation, including the setting up and operation of early warning systems (EWSs), as well as preparedness for response, recovery and rehabilitation; and
- /// CCA/DRR financing, including public and non-public financing.

International agreements. Major international commitments of the country in the area of CCA/DRR are set out in the UN Framework Convention on Climate Change (UNFCCC) and its Paris Agreement, the Sendai Framework on DRR for 2015-2030 and the EU-Georgia Association Agreement (EUAA). They include such obligations as periodic reporting under the agreements, development of INDC/NDC and its submission to UNFCCC, development of a national CCA framework and its implementation, and development of an EU-compliant flood assessment and management system in Georgia, etc.

National statutory and policy documents. National statutory and

policy requirements are defined by such major legal and policy documents as: the Law on Environmental Protection (as amended in December 2017); the Law on Air Protection (as amended in December 2017); the Law on Government Structure, Functions and Operations procedures (as amended in June 2018); the 2014 Law on Emergency Situations (as amended in December 2017); the Law on Civil Safety (03/05/2018; statuses of various key Ministries and their subordinated bodies; INDC; National Environmental Action Programme-3 (NEAP-3); National Civil Safety Plan; National DRR Strategy and Action Plan; relevant development and sectoral plans (e.g. Basic Data and Directions (BDD), Agriculture and Rural Development Policies, etc.).

Institutional setting. According to the current CCA/DRR architecture of Georgia, the institutional setting in this field is quite complex, involving the Emergency Management Service (EMS) under the Prime Minister's Office, numerous Line Ministries together with their subordinated bodies, regional governors' offices and local governments.

Key Ministries engaged in CCA/DRR are as follows:

- /// Ministry of Environmental Protection and Agriculture (MoEPA) - Climate Change Division (CCD) under the Environment and Climate Change Department, the National Environmental Agency (NEA), the Environmental Information and Education Centre (EIEC), the National Food Agency (NFA), and the Agriculture Research and Consultation Centre (ARCC);
- /// Ministry of Regional Development and Infrastructure (MRDI) – Road Department, Department for Implementation of Regional Projects, Department for Coordination with Local Governments, Spatial Planning Department, recently transferred from the Ministry of Economy and Sustainable Development (MoESD) to MRDI, and the Municipal Development Fund (MDF);
- /// Ministry of Justice – National Agency for Public Registry (NAPR);
- /// Ministry of Internal Affairs (MIA) - 112 Service and Joint Operations Centre (JOC);
- /// Ministry of Internally Displaced Persons from Occupied Territories, Health, Labor and Social Affairs; and
- /// Ministry of Education, Science, Culture and Sports (MoESCS).

The above-mentioned authorities perform a wide spectrum of functions in the area of CCA/DRR, including:

- /// reporting under international agreements;
- /// development of CCA/DRR legal-regulatory, policies and planning frameworks;
- /// implementation/coordination of implementation of CCA/DRR laws, regulations, strategies and plans;
- /// building hazard and risk knowledge; and
- /// financing activities and projects in the realm of CCA/DRR.

Apart from public agencies, various Non-Governmental Organizations (NGOs), including the Red Cross of Georgia, ASB, CENN, RECC, Association Rural Development for Future Georgia (RDFG) et al., and academic and research institutions, are engaged in aspects of CCA/DRR such as capacity building of various institutions and local communities in disaster preparedness and response, awareness raising and education, and preparedness and response, including humanitarian aid, recovery and rehabilitation.

Major donors active in CCA/DRR are as follows:

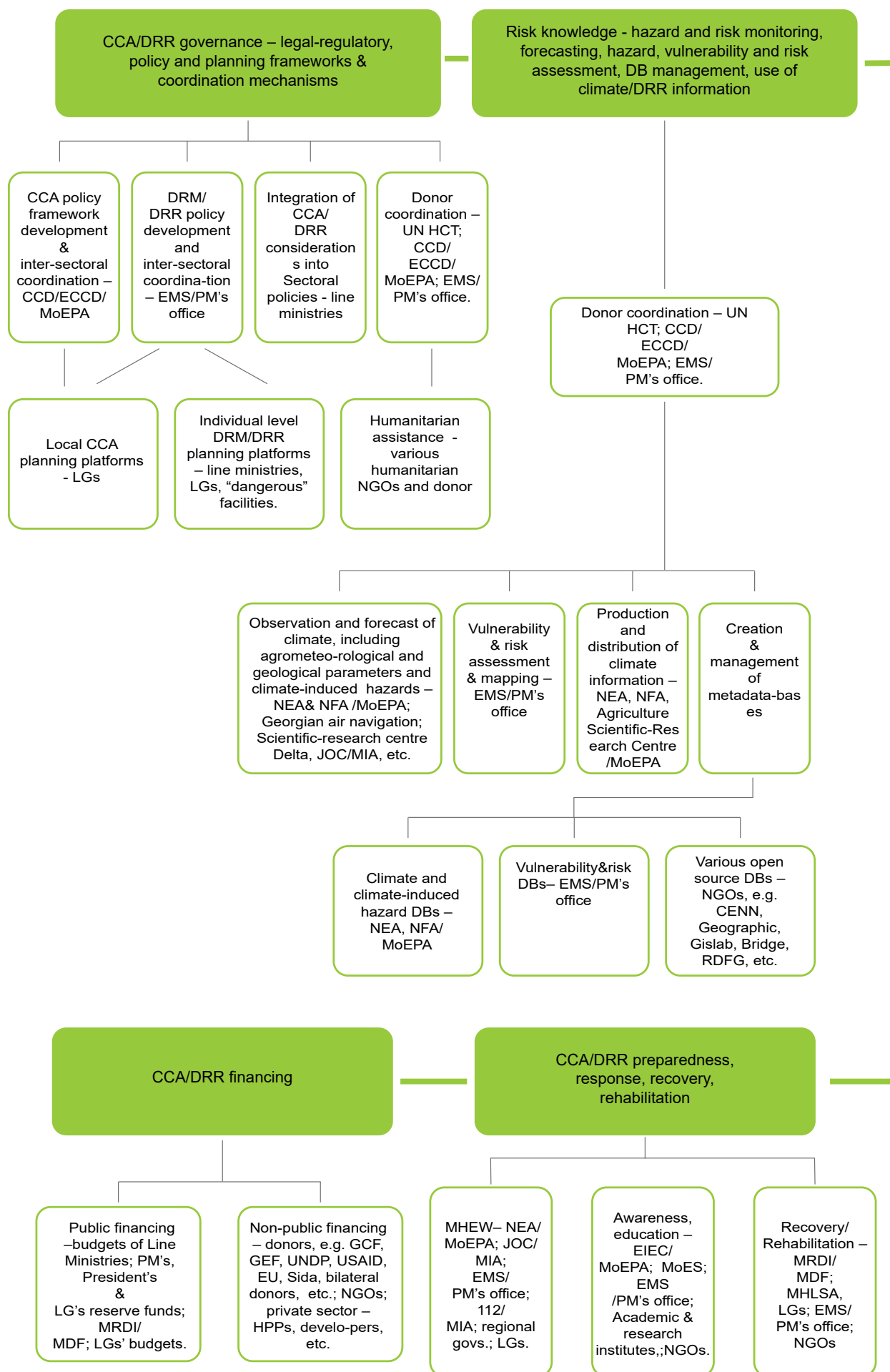
- /// SDC, supporting capacity development for DRR and hazard mapping, including development of capacities of academic institution in DRR and hazard mapping;
- /// UNDP supporting preparation of the Fourth National Communications to UNFCCC through the financial assistance from Global Environmental Facility (GEF), as well as establishment of a near-real-time multi-hazard early warning system across the country through the financial assistance from the Green Climate Fund (GCF) and SDC;

- // GCF supporting enabling activities for a GCF National Designated Authority, as well as establishment of a near-real-time multi-hazard early warning system across the country through UNDP and SDC's co-financing;
- // The Polish and Czech governments supporting hydromet services in Georgia;
- // The French government, through the EU Twinning programme, helped the former Emergency Management Agency (EMA) purchase and install a virtual data server for the DRR GIS-compatible computer programme Geonode-2.4-b22;
- // EU, supporting adoption of major provisions of the Flood Directive, improvement of water quantity monitoring, development of river basin plans for certain pilot basins and implementing a pilot DRR/CCA including climate-smart agricultural measures under its rural development projects piloted in a number of municipalities under the **ENPARD II and III programs**;
- // EU/DIPECHO through UNICEF Georgia in cooperation with ASB and MES supported integration of DRR in education (middle-school) from 2010 to 2015;
- // SIDA supporting establishment of information/data management systems in line with EU standards;
- // FAO supporting development of agrometeorological monitoring and advisory services;
- // The World Bank supporting rehabilitation of irrigation-drainage systems in selected priority areas and capacity development of institutions responsible for irrigation-drainage management under the ongoing USD 50 million project: **Irrigation and Land Market Development** (2014-July 2021);
- // The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) through GiZ supporting: i) the project **Capacity Development of South-East, East Europe, South Caucasus and Central Asian Countries in Implementing CC Policies**, 3rd phase (2017-2021), including a study of EU CC and energy directives and 20/20/20 agenda, and a study of national CC mitigation and adaptation policies; ii) development of the National Spatial Arrangement Plan and Spatial Arrangement and City Plans for selected municipalities;
- // UNEP/GEF supporting introduction of landscape and sustainable land management practices; and
- // Caucasus Nature Fund (CNF), KfW, GiZ supporting development of the protected areas system in Georgia, as well as forestry sector reform.

The Humanitarian Country Team (HCT) acts as a humanitarian coordination structure performing under the leadership of the UN Resident Coordinator/Humanitarian Coordinator (RC/HC). Following the request of the Government of Georgia (GoG) for humanitarian assistance, the RC/HC activates the HCT, which then immediately convenes a first meeting following the onset of a disaster, and helps to set the direction for a response to the same. The RC as the UN Designated Official for Security convenes a Security Management Team (SMT) meeting to discuss the critical response activities, risk assessment and security capacity, which involve all relevant international and national staff.

In general, the GoG bears an overall responsibility for the management and coordination of the humanitarian action through the EMS, led by the Prime Minister. The EMS implements its decisions through relevant government executive emergency structures including the National Crisis Management Center (NCMC), line ministries and local authorities. International humanitarian assistance is aimed to support the Government's response efforts, and its delivery and coordination need to be aligned to the government's response plans and coordination schemes. Local NGO's performance coordination is a subject of agreement between the HCT and the Georgia Red Cross Society which is mandated to coordinate NGOs according to the Law on Civil Safety.

The flowchart below shows the functional relations between various stakeholders in the area of CCA/DRR.



Capacity gaps and needs

The capacity gaps and comparative analysis section of this study identifies the relevant legal-regulatory, policy and institutional capacity gaps for CCA/DRR against commitments taken by the country under international agreements, including the UNFCCC/Paris Agreement, the Sendai Framework and the EU-Georgia Association Agreement (EUAA), as well against national statutory and policy requirements.

The findings of this study concerning capacity gaps and needs are as follows:

CCA/DRR governance

- ▶ Reporting requirements under international conventions:
 - *Georgia is obliged to submit its 4th National Communication to the UNFCCC, which is being currently elaborated. As previous experiences and lessons learned indicate there is no adequate QA/QC system for climate change predictions and vulnerability assessments and it is advisable to set up the system-Georgia was obliged to submit on-line its Sendai Framework monitoring report as of March 2018 against the Programme's targets and indicators. The data readiness report submitted in 2017 indicated the absence/shortage of data on major indicators to be reported. Thus, there is a need for developing DRR statistics, setting up a monitoring and reporting system and preparing annual on-line monitoring reports under the Sendai Framework*
- ▶ CCA/DRR Legal-regulatory framework:
 - *Regardless of the presence of framework CCA/DRR laws; e.g., the Law on Civil Safety and Law on Emergency Situations, they need significant updating in order to properly address legal gaps, such as setting clear criteria for the classification of disasters.*
 - *Specific regulations stipulated from framework laws and legal gaps should be developed, including: i) methodologies on multi-hazard, vulnerability and risk assessments and mapping; ii) methodologies on flood assessment and mapping; iii) communication protocols for multi-hazard early warning systems; v) regulation on developing emergency situation passports by municipalities; and vi) standard operating procedures (SOPs) for individual entities engaged in the unified emergency management system.*
 - *CCA/DRR considerations are not well-integrated in land use zoning and spatial planning nor in building codes, and thus there is a need for such actions.*
- ▶ CCA/DRR policy framework and planning platforms:
 - *There is no national adaptation policy (NAP) framework and related inter-agency coordination mechanism in the country. Therefore, there is a need for developing such a policy framework and setting up an effective coordination mechanism.*
 - *The existing Intended Nationally Determined Contribution (INDC) submitted to the UNFCCC Secretariat as a requirement under the Paris Agreement is not detailed enough in terms of intended CCA commitments. In addition, the INDC should be transformed into an NDC once committed to by the*

country. Moreover, a multi-stakeholder committee should be created to coordinate the NDC process as well as to ensure a strategic approach towards accessing GCF funds.

- *Integration of adaptation considerations into development and sectoral strategies is limited and there is a need for making efforts towards developing adaptation strategies for priority sectors; e.g., hydropower, water resources management, drinking water supply, hydropower, irrigation and drainage, infrastructure development etc. Focal points at each relevant sectoral Ministry should be assigned and their awareness raised on CCA adaptation issues.*
 - *Regardless of the existence of a national Law on Civil Safety and DRR policies, some of these documents are outdated (e.i. Civil Safety Plan) and need updating and/or greater detail in terms of reflecting the new institutional setting and inclusion of hazard, vulnerability and risk assessments together with relevant hazard and risk maps (relevant to DRR Strategy). In order to ensure engagement of various stakeholders for their experts' opinion, an advisory strategic planning panel/commission should be created for DRR strategic planning purposes as prescribed by the Law on Civil Safety.*
 - *Emergency risk management planning platforms, necessary for individual entities within the unified emergency management system (e.g. individual Ministries, municipal governments, etc.) are significantly lacking. Thus, there is a need for developing such planning frameworks, including threat assessment documents at the municipal level.*
- **Institutional setting:**
- *Inter-agency, government-donor and state and local governments' coordination mechanisms either do not exist or are inactive. Thus, they should be strengthened by establishing clear communication lines between all key actors and creating multi-stakeholder coordination/advisory bodies for both CCA and DRR; contact persons should be nominated in each Line Ministry for better integration of CCA into development and sectoral policies.*
 - *There is a need for significant DRR capacity building at central level - EMS, recently established through the merger of SSCMC and EMA, needs institutional and staff-level capacity building in terms of optimum organization structure, job descriptions, skills and qualifications of staff, procedures, etc.*
 - *There is a need for significant capacity building of local governments in: i) identification of climate-induced hazards, vulnerabilities and risks; ii) development of detailed instructions/methodologies at local level for CCA/DRR planning; iii) development of CCA/DRR and preparedness and response plans; iv) setting up of local units for CCA/DRR and/or designating resilience officers from the staff of local municipalities; and v) accessing various international technical assistance funding mechanisms; e.g., the Covenant of Mayors – Adapt, etc., GCF, GEF.*
 - *At municipal and community levels, a volunteers' system should be established and strengthened, including creation of a volunteers' registry, training centres and programmes and local volunteer groups.*
 - *Emergency reserves should be developed at national, regional and local levels.*

/// Risk knowledge – hazard and risk monitoring, forecasting, hazard, vulnerability and risk assessment, database management and use of climate information¹

- **Monitoring:** Hydrometric, agrometeorological and ground water monitoring is lax in terms of density, geographic distribution, number and type of parameters measured and continuity of measurements (continuous versus manual); comprehensive geological and topographic surveys in order to depict landslide inventory (isopleth) maps are not carried out frequently enough. The aerial photography is also of limited use. Thus, there is a need for expansion and upgrade of existing hydrometric, agrometeorological and ground water monitoring networks.
- **Forecasting:** Existing synoptic and hydrological forecasts are not precise enough in terms of

¹ Gaps and needs for climate-induced natural hazard modeling/forecasting are discussed in detail in the second baseline report on Hazard Assessment and Mapping System in Georgia.

the spatial and temporal dimensions due to lack of necessary real-time hydrometeorological data and equipment. Moreover, there are no modern, near-real-time fully-integrated forecasting platforms for other climate-induced hazards. Thus, there is a need for developing effective and reliable forecasting platforms for all climate-induced natural hazards.

► Hazard assessment, mapping and database:

- *There is no unified geo-spatial information system in the country, including a functional geoportal with relevant meta-databases and standard specifications for meta-databases*
- *NEA, a responsible body for hydrometeorological and geological monitoring, climate-induced hazard assessment and mapping, neither has nor maintains any user-friendly standardized electronic database on hydrometeorological and geological parameters and climate-induced natural hazards. The bulk of the historical information stored/archived at NEA is in paper or in a user-unfriendly electronic format.*
- *NEA's geospatial meta-databases are not standardized nor are they linked to the newly established geoportal.*
- *Hydrometeorological and geological information, which NGOs, academic and research institutions and development projects require for research, educational and development purposes is not available free-of-charge.*
- *The largest compilation/depository on hazard, expose and risk maps of the country contained in the open-source renewable Geoportal of Natural Hazards and Risks of Georgia created by the CENN is outdated and maps included there are of too-small scale.*
- *NEA does not have hazard maps for all climate-induced hazards and for all major river basins. There is also a lack of large-scale (1:5,000 and 1:10,000) maps. Multi-hazard maps are also absent within the NEA.*

Stemming from the above, there is a need for:

- *Establishing a unified geoportal, developing geo-spatial information standards, conforming existing meta-databases with such standards and linking them with the national geoportal;*
- *Developing larger-scale hazard maps for all climate-induced natural hazards and for major river basins;*
- *Establishing user-friendly electronic database(s) on hydrometeorological and geological parameters and climate-induced hazards within the NEA;*
- *Making monitoring and hazards data available for free for research and educational purposes; and*
- *Updating of the existing natural hazards atlas.*

► Vulnerability and risk assessment, mapping and database

- *There is no technical knowledge, capacity and readily available socio-economic data to conduct vulnerability and risk assessments;*
- *Vulnerability assessments and risk maps do not exist for all climate-induced natural hazards nor for all major river basins;*
- *A national database on vulnerability/exposure and risks does not exist; and*
- *The Geoinformation portal Geonode-2.4-b22 kept at the Operation Control/Management Centre (OCMC) of the EMA under EMS does not have neither the digital hazard maps developed by the NEA, nor the Geographic Information System (GIS) land inventory data held at the Web Map Service (WMS) of the National Agency of Public Registry and other spatial data stored with various national agencies and institutions.*

Thus, there is a need for:

- *Conducting vulnerability and risk assessments for all climate-induced hazards and for all major river basins; and*
- *Establishing a national user-friendly electronic database, based on already existing Ge-*

onode-2.4-b22 on vulnerability/exposure and risks and linking it with the national geoport and other meta-databases.

- ▶ Use of climate information: There is no common practice in the country for applying climate information by various sectors and end users, including irrigation/drainage, hydropower, roads/traffic management, insurance and agricultural sectors. Currently, these types of activities are limited to providing advice to farmers only on the use of pesticides, based on e.g. climate conditions. This is done by the NFA under the MoEPA. Thus, there is a need to develop climate information and advisory products and diversify the end users of the same.

CCA/DRR financing

- ▶ State budget for DRR/resilience measures
 - *The total amount spent on recovery and rehabilitation works annually is significant, but is still very small compared to annual average losses. Financing of resilience actions is mostly focused on response, recovery and rehabilitation. Therefore, there is a need to increase state budgetary allocations for such activities as afforestation-reforestation, natural regeneration of forests, restoration of floodplain forests, terraces and riverbanks by using bioengineering methods, etc.*
 - *A dire situation exists in terms of financing hydrometeorological and geological monitoring and forecasting services. NEA's budget's dynamics, related to hydrometeorological and geological monitoring and forecasting show an alarming decreasing trend for 2017-2018, and the 2019 forecast that is related to removal of one of the largest source of financing for NEA (royalties from natural and mineral resources use licences). Thus, the NEA's budget needs significant revision, in relation to its increased obligations under international agreements. In addition, work should be carried out to diversify and improve NEA's climate and hydrometeorological services for additional revenue generation.*
- ▶ Local budgets for DRR/resilience measures: Local municipalities have very limited budgets for DRR. Most DRR/resilience measures are funded through the state budget, including the Municipal Development Fund (MDF) and the Fund for the Implementation of Regional Projects, and only for structural DRR measures and rehabilitation of damaged infrastructure. Thus, there is a need for increasing local budgets for DRR and refocusing local financing to such activities, as afforestation-reforestation, natural regeneration of forests, restoration of floodplain forests, terraces and riverbanks by using bioengineering methods, watershed and wetlands restoration, etc.
- ▶ Private investments: Private investments in DRR are only limited to the financing of some minor hydrometeorological and geological services through information user fees, defined by the NEA. Thus, there is a need to diversify climate advisory services and revenues received from them, including setting up flood and other natural hazard insurance systems.
- ▶ International Development Assistance: Donor assistance in CCA and in particular DRR is insufficient to compensate annual average losses from climate-induced natural disasters. Therefore, efforts should be intensified to attract donor assistance in the area of DRR/CCA and as well, more effective international funding mechanisms available such as GCF funds.

Preparedness

- ▶ MHEWS: There is no multi-hazard early warning system at national, regional or community levels, while the existing hydrometeorological and geological monitoring system does not support establishment and operations of such systems in terms of the density of the network, continuity of measurements and parameters measured. Its components exist only for some hazards, and these at a limited scale. Forecast, warning and communication, including last-mile communications, are not precise or operational enough in terms of spatial and temporal dimensions. There are no community-based early warning systems in the country that ideally, should be part of a nation-wide early warning system. Thus, there is a need for establishing a fully-integrated anear-real-time Multi-Hazard Early Warning System, includ-

ing effective warning and communications at national, municipal and community levels.

- ▶ Implementation of CCA/DRR measures: operational capacities, including knowledge and skills to implement CCA/DRR measures, are weak at all levels. The work towards research, development and diffusion of adaptation technologies is very limited. The focus is more on response and rehabilitation measures, rather than on preventive measures; e.g., the integration of climate/disaster risks in land use zoning and spatial planning, building codes, application of climate-smart technologies and practices such as drip and sprinkle irrigation, drought-resistant local landraces and endemic crops, bioengineering, including agroforestry methods for riverbank and slope stabilization, etc. Thus, there is a need for knowledge and skills development towards the application of preventive measures, as well as for implementation of demonstration disaster prevention projects.
- ▶ Community-based Multi-Hazard Risk Management process: Communities in Georgia have very limited or no knowledge on climate-induced natural hazards, vulnerabilities and risks, and are not prepared in terms of proper response capacities. More specifically, they do not have community preparedness and response plans, mapped evacuation routes, evacuation centres, local warning systems or a first-response team. Moreover, there is no common practice of implementing community-based multi-hazard risk management/reduction processes, where local communities plan and implement DRR/CCA initiatives, e.g. watershed, floodplain and wetland restoration and slope stabilization measures using bioengineering (e.g. agroforestry) methods etc. Thus, there is a need to introduce and implement participatory community-based Multi-Hazard Risk Management processes in vulnerable communities affected by climate-induced natural hazards.
- ▶ Public awareness: Public awareness on DRR is crucial for better preparedness for response and communities' resilience. In general, DRR awareness at both national and local levels is very low and there is thus a need for comprehensive education, awareness/public information campaigns and programmes targeting all levels of educational institutions, media, rural communities, vulnerable groups including people living under the poverty line, internally displaced persons (IDPs), people with disabilities, the elderly, single mothers, decision-makers and the broader general public.

**Summary of
recommended
actions
(Road Map)**

Based on identified capacity gaps and needs, the study suggests recommended actions for the period 2018-2023. Each of the actions is linked with relevant capacity gap(s)/need(s), international obligations, national statutory and policy requirements, responsible parties, potential source(s) of financing/donor(s), approximate cost and an indicative timeframe for it to be carried out.

According to cost criteria, actions are divided into low (up to 100,000 USD), medium (100,000-1,000,000 USD) and high (above 1,000,000 USD) cost

categories. In relation to timeframe, actions are divided into short-term (up to one year), mid-term (one to three years) and longer-term (three to five years) categories.

Recommended actions are grouped according to four priority DRR strategic directions, as defined by the Sendai Framework, a global DRR programme for 2015-2030. These are: i) CCA/DRR governance, ii) Risk knowledge, iii) Preparedness and iv) CCA/DRR financing. They represent a wide variety of measures, mostly of a non-structural nature, that together aim at:

- // setting up of and/or improving reporting systems under international agreements;
- // improving the national CCA/DRR legal-regulatory and policy framework. This includes inter alia the integration of CCA/DRR considerations into land use planning and construction; development of methodologies for multi-hazard (including flood) assessment and mapping; methodologies for multi-hazard vulnerability and risk assessments and mapping; a national protocol for Multi-Hazard Early Warning Systems (MHEWS); SOPs for various institutions etc.
- // improving emergency preparedness and response and CCA/DRR planning platforms at river basin and municipal levels;
- // building national and local capacities of key decision-makers in CCA/DRR through designing and implementing professional training and re-training programmes;
- // improving hazard and risk knowledge through:
 - *expanding and upgrading hydrometeorological, agrometeorological, geological and groundwater observation networks;*
 - *establishing near-real-time fully integrated multi-hazards forecasting platforms;*
 - *intensifying field hydrological, snow cover and geological surveys;*
 - *intensifying glacial studies;*
 - *conducting multi-hazard, vulnerability and risk assessments and mapping for all major river basins; and*
 - *creating user-friendly electronic hazard, exposure and risk metadatabases;*
 - *Establishing almost real-time fully-integrated MHEWS for all major river basins;*
 - *Establishing community-based multi-hazard early warning systems and supporting climate risk management processes in most vulnerable remote communities;*
 - *Improving public and non-public financing for CCA/DRR by using a more strategic approach towards allocating financial resources for CCA/DRR (e.g. applying Cost-Benefit Analysis, financing of preventive measures, etc.), and mobilizing donor and private-sector financing; and*
 - *Designing and implementing all-level curricular and extra-curricular educational programmes and public outreach campaigns targeting youth, decision-makers, vulnerable communities and the general public.*

Introduction

1.0 Objective, scope and methodology of the study

This report “Comparative analysis of the climate change adaptation and disaster risk reduction architecture and norms in Georgia and recommended actions (road map)” was prepared under the inception phase of the project “Strengthening the Climate Adaptation Capacities in Georgia”. It was implemented by the UNDP Country Office in Georgia with financial support from the Swiss Agency for Development and Cooperation (SDC). The report is a baseline assessment with the primary objective to collect the missing scientific, technical and statistical data necessary to inform and enrich existing capacities, gaps, challenges and setup for disaster risk reduction/management (DRR/DRM) and climate change adaptation (CCA) in the country, both on national and local levels, with comprehensive analytical information.

The study consists of the following sections:

- /// Stakeholder analysis of CCA/DRR systems in Georgia;
- /// Assessment of existing state and practices of CCA and DRR and progress achieved in approximation with commitments under the EU and Georgia Association Agreement (EUAA), as well as gaps and needs in CCA/DRR; and
- /// An action plan (roadmap) for 2018-2023 with prioritized actions for enhancing CCA/DRR capacities as per identified capacity needs.

More specifically, the stakeholder analysis section of the study takes stock of the existing CCA/DRR legal-regulatory and policy basis for - and institutions engaged in - CCA/DRR, including government entities, academic and research institutions, and Civil Society Organizations (CSOs) at national and local level. It focusses on functions/mandates, organizational setting and present capacities of institutions related to all aspects of CCA, including CC and disaster risk prevention and mitigation (such as CC adaption measures, sustainable natural resources and land use practices, climate and disaster-proof design of buildings and infrastructure and early warning systems), preparedness, response, recovery and rehabilitation/ reconstruction, except for hazard mapping, which is within the scope of another baseline study on Assessment of Hazard Mapping System in Georgia.

The capacity gap and comparative analysis section of the study identifies relevant legal-regulatory, policy and institutional capacity gaps for CCA/DRR against international commitments taken under the UNFCCC and EU-Georgia Association Agreement (EUAA), as well against national statutory and policy requirements. Based on the gaps identified, it suggests recommended actions (a road map) for the period 2018-2023, in order to develop national and local CCA/DRR capacities period per the identified gaps and needs.

The assessment only addresses mandates and capacities of stakeholders engaged in managing/reducing the risk of climate-induced disasters, such as floods, flash floods, mudflows, rockfalls, avalanches, strong winds, hail events, droughts etc. Furthermore, the study reviews and analyses the situation at central, regional and local level except for the Adjara Autonomous Republic, which is covered by another consultancy assignment commissioned by the UNDP Inception phase project funded by SDC.

This report was developed by applying the following methodology:

- /// conducting a desk review of:
 - *international agreements in the area of CCA/DRR*
 - *the legal-regulatory basis in the area of CCA/DRR*
 - *policy/strategic documents in the area of CCA/DRR*
 - *previous reports and studies related to the relevant current institutional setting in the area of DRR/CCA; in particular, the feasibility study and funding proposal of the UNDP/SDC/GCF project “Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia” (hereafter, the UNDP/SDC/GCF MHEWS project);*
- /// vis-à-vis interviews with representatives of:
 - *MoEPA and in particular, the NEA’s hydrometeorology and geology departments, and the National Food Agency (NFA);*
 - *MIA/JOC;*
 - *Emergency Management Service (EMS);*
 - *Ministry of Regional Development and Infrastructure (MRDI; in particular, the Roads Department);*
 - *Tbilisi Mayor’s Office;*
 - *Tbilisi State University, Ilia State University, Georgian Technical University, and various research institutes affiliated with key higher education institutions; and*
 - *relevant NGOs, donors/donor projects and private companies.*
- /// conducting a qualitative survey of local municipalities based on a specially elaborated questionnaire for local municipalities²;
- /// organizing and holding a stakeholder consultation;
- /// the compilation and analysis of existing documentation and completed questionnaires, the results of which are given in the body of this report; and
- /// preparing a comparative analysis of existing CCA/DRR norms, practices and institutional capacities in regard to international commitments and national requirements, including identification of gaps.

The following limitations were noted during the study:

- /// there are missing data on the CCA/DRR situation for some of the regions, including Kvemo Kartli, Imereti and Kakheti regions (detailed information is discussed in the narrative part of the report);
- /// the poor quality of information contained in the filled out and submitted questionnaires, including inconsistencies, lack of completeness and the misunderstanding of questions; and
- /// absent clear internal structure of some of the critical DRR institutions, e.g. Emergency Management Service, etc. that have recently undergone institutional changes.

² Questionnaires were handed out to regional authorities of each administrative region for distribution among relevant local governments, except for the Adjara Autonomous Republic, for which a separate study is being carried out with SDC/UNDP support.

2.1 Geographic and environmental context³

2.1.1 Geography

Georgia is located in the South Caucasus region, between the Black Sea to the west, the Greater Caucasus Mountains to the north and the Lesser Caucasus Mountains to the south. The total area occupied by the country is 69,700 km² and 80% of the territory is mountainous. On the north, Georgia is bordered by the Russian Federation, with the borderline running along the crest of the Greater Caucasus mountain range (maximum elevation 5,000 m ASL (Above Sea Level), and on the east and southeast by Azerbaijan, and on the south and southwest by Turkey and Armenia, respectively. The western edge of the country is the 310-km long Black Sea coastline.

The country has a diverse and complex terrain, with its northern parts characterized by high mountains and the central and southern parts by medium height to lower mountains, covered with alpine and sub-alpine meadows and forests. Western Georgia's landscapes range from low-land plains, marsh-forests, swamps and temperate rainforests to eternal snows and glaciers, while the eastern and south-eastern and southern parts of the country contain floodplain valleys and forests, light (savannah type) forests, steppes and semi-deserts.

Georgia's climate is predetermined by its complex terrain and the movement of regional air masses. Much of western Georgia is located within the northern periphery of the humid subtropical zone, with annual precipitation ranging from 1,000 to 4,000 mm. In low to middle-mountain regions, the climate varies from humid sub-tropical to alpine. At some places (high mountains) the humid-subtropical climate zone abruptly changes to permafrost. Eastern Georgia is characterized by the climate transition from humid subtropical to continental, and has considerably lower annual precipitation (400 to 1,600 mm).

2.1.2 Natural resources

Water resources. Georgia is known for its abundant fresh water resources, with more than 26 thousand rivers of which the majority fall under the "small river" category. All rivers in Western Georgia belong to the Black Sea Basin, while those in Eastern Georgia belong to the Caspian Sea Basin. Groundwater reserves are estimated at 18 billion cubic meters annually.. Georgia also has more than 800 freshwater lakes and substantial mineral water resources, with an estimated 2,300 springs. Over 600 glaciers are currently registered within the territory of the country and cover a total area of 355.8km².

Forest resources. Forests occupy 2,772,400 ha in Georgia, 39.9% of the country's total area. Of this, 500,000 ha are primary forests, 2,200,000 ha are naturally modified forests and 60,000 ha are wind breaks. Other wooded land makes up another 50,000 ha and is 100% naturally modified. Mountain forests with protective functions, including a DRR function, make up about 78.4% of total forests, while forests with conservation functions including riparian forests total 8.2% and forests for economic use (logging for fuel wood production) 13.4%. Total forest stock is estimated at 451.7 million m³. The average growing stock per hectare is 167 m³ and the annual increment is 4 Million m³.

³ Source: Feasibility study, Annex II, GCF project: Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia.

Land resources. Georgia has scarce land resources, with 65-70% of the country covered by soils poor in the nutrients necessary for normal growth and productivity of crops. Only 43.5% of the total land is occupied by cultivated areas, of which 35% are arable lands and perennial plantations, the rest being pastures and hayfields. The majority of pastures are located in high-mountain, sub-alpine and alpine zones. Over 60% of arable lands are situated at elevations greater than 500 m ASL, with some of them located at elevations greater than 1,500 m ASL. Quite a large proportion of agricultural land (6.7%, or 205,000 ha) has less productive and saline soils, 8% (300,000 ha) are covered by acid soils and 7.3% (210,000 ha) by boggy soils. Five climatic and eight soil zones important for land cultivation can be identified in Georgia. There are 49 soil types concentrated on 10 different soil-forming rocks. In addition to soil quality, altitude determines the suitability of lands for agricultural purposes and there are six such vertical zones found in Georgia.

Biodiversity. Georgia is rich in biodiversity, with the following land biomes/landscapes found in the country: floodplain forests, wetlands, semi-deserts, steppes, arid light woodlands and hemixerophyte scrub, low, medium and high mountain forests, subalpine ecosystems, alpine ecosystems and sub-nival zone. More than 28,900 species have been recorded, of which 2,745 are algal species, more than 8,000 fungi and lichens, 4,100 vascular plants and about 14,100 known animal species. About 7.35% (512,123.17 ha) of Georgia's territory is designated as Protected Areas. Of these, 75% is forest area. There are 14 nature reserves, nine national parks, 18 managed resources, 21 natural monuments, two protected landscapes and one multiple use area in Georgia.

2.2 Development context

Georgia is a country with a transitional economy which has undergone notable transformation since 2003, from a "failed state" to the middle-income country, with an HDR index of 0.769, 16th rank among 190 world economies by "Doing Business" in 2017⁴ and 46th rank among 180 countries in the "Corruption Perception Index" in 2017⁵ (the leading figure among Eastern Europe, CIS and Central Asian countries). The main sectors of Georgia's economy are: trade and services (17.6% of total share of GDP), industry (16.4% of GDP), transport and communication (10.2% of GDP), public administration (8.5% of GDP), agriculture, forestry and fishing (8.2% of GDP), real estate, renting and businesses (6.9% of GDP) and the health/social sector (6.0% of GDP)⁶ and other.

Around 43% of the total population lives in rural areas and is primarily engaged in agriculture, being a dominant source of financial and non-financial income for them. It is also a slow-growing sector, with negative -2.7% real GDP growth rate in 2017 compared to the previous year, and only a 1.04% average annual real GDP growth rate during 2011-2016. The majority of economic assets and activities are concentrated in urban areas, predominantly in Tbilisi and a few other large cities (e.g. Batumi, Kutaisi)⁷.

Concerning employment and income statistics, 55.6% of the Georgian workforce is employed in the agricultural sector, of which 83% is self-employed. The majority of self-employed people in Georgia represent the rural population engaged in subsistence agriculture, heavily dependent on the local natural resources base. In general, there is a sizable disparity between average household and per capita monthly incomes of the urban and rural populations. More specifically, average rural household monthly cash income in 2016 was nearly 34% less than average urban household monthly cash income, and average monthly rural per capita cash income was 37% less than average monthly urban per capita cash income⁸.

Concerning the poverty level, in 2016 the share of urban population under the absolute poverty

4 Source: Feasibility study. Annex II, GCF project: Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia

5 Source: 2017 Corruption Perception Index. Transparency International. https://www.transparency.org/news/feature/corruption_perceptions_index_2017

6 Source: Gross Domestic Product of Georgia, 2017 (Preliminary Results). Press Release. National Statistics Office of Georgia (Geostat). http://geostat.ge/cms/site_images/_files/english/nad/Press%20release%20GDP%202017_Eng.pdf

7 Source: Geostat. 2017, 2016 data. www.geostat.ge

8 Source: Geostat. 2016 data. www.geostat.ge

line was 16.9% and that of rural population 25.5% (50% more than that of urban population). The share of urban population under 60% of median consumption was 14.5%, and 4.4% were under 40% of median consumption. Meanwhile, the share of the rural population under 60% of median consumption was 26.5% (83% more than the share of urban population), and 9.6% were under 40% of median consumption (119% more than the share of the urban population), indicating significant to extreme poverty in rural areas⁹.

2.3. DRR profile¹⁰

2.3.1 General context

Georgia is ranked 84th out of 191 countries on the Index for Risk Management (INFORM-2017) scale, which covers all types of risk (e.g. political and natural disaster risk) and coping capacity. It ranks 88th for Hazard Exposure and 139th for lack of coping capacity. With an overall index of 3.9 out of 10 (10 being the highest/worst), it is at the global average overall. However, with a hazard and exposure index (natural hazards) of 4.5 (floods and droughts have indices of 5.7 and 5.4 respectively), a vulnerability index of 4.6 (vulnerable groups index of 5.9), and an Institutional coping capacity of 4.6 (DRR index is 4.7 and Governance 4.4), the disaster risk profile of Georgia is actually much worse than the overall figures suggest.

Due to its 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.

In accordance with the UN CADRI assessment, the total damage during the last 40 years has exceeded 14 billion USD. The damages from single extreme events range from over 300 million GEL or 121 million USD which was attributed to the extreme drought of 2000, to 700 million GEL or 283 million USD attributed to the 1987 flood.

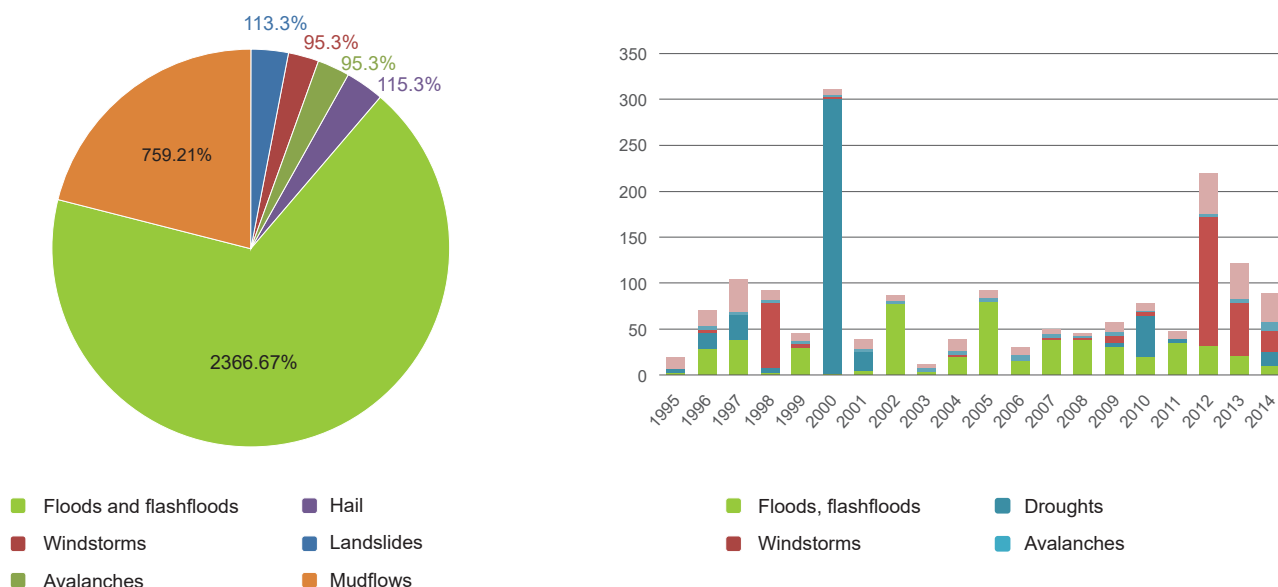


Figure 1: Contribution of various hydrometeorological and geological natural disasters in total hazardous events and damage – a) Percentage share of various hazards in total number of hazardous events, 2008-2014; b) Damage distribution among years and various types of hazards in millions of GEL.

9 Source: Geostat. 2016 data. www.geostat.ge

10 Source: Feasibility study. Annex II, GCF project: Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia.

2.3.2 Hydrometeorological hazards

Floods and flash floods. Floods are very frequent in Georgia, with recorded high-water levels during spring and summer months, when intensive spring rainfalls coincides with snowmelt. Flash floods may happen unsystematically depending on many factors, including the intensity and duration of heavy spring rains and the rate of the snowmelt, autumnal frontal rains and heavy winter rains along the sea coast.

According to the NEA's flood susceptibility map, developed based on historic flood data, the following river basins and their sub-basins are the most susceptible to flood and flash flood hazards:

- /// Upper and Lower courses of the Rioni river basin – Racha-Lechkhumi (flash floods) and the area below Kutaisi, including the Rioni delta (four to five communities of Khobi municipality);
- /// Lower course of the Enguri river basin – Zugdidi municipality;
- /// Kura River basin – Gori and Kaspi municipalities and Tbilisi depression;
- /// Lower Courses of Supsa, Ajaristskali-Chorokhi and Kintrishi rivers. In recent years (Springs of 2013, 2014, 2017, 2018) due to spring heavy rains, an intensification of flash floods was observed within the Supsa, Ajaristskali and Kintrishi River Basins; and
- /// Alazani-Iori river basin – slopes of Gombori and Caucasus mountain ranges and Alazani plain.

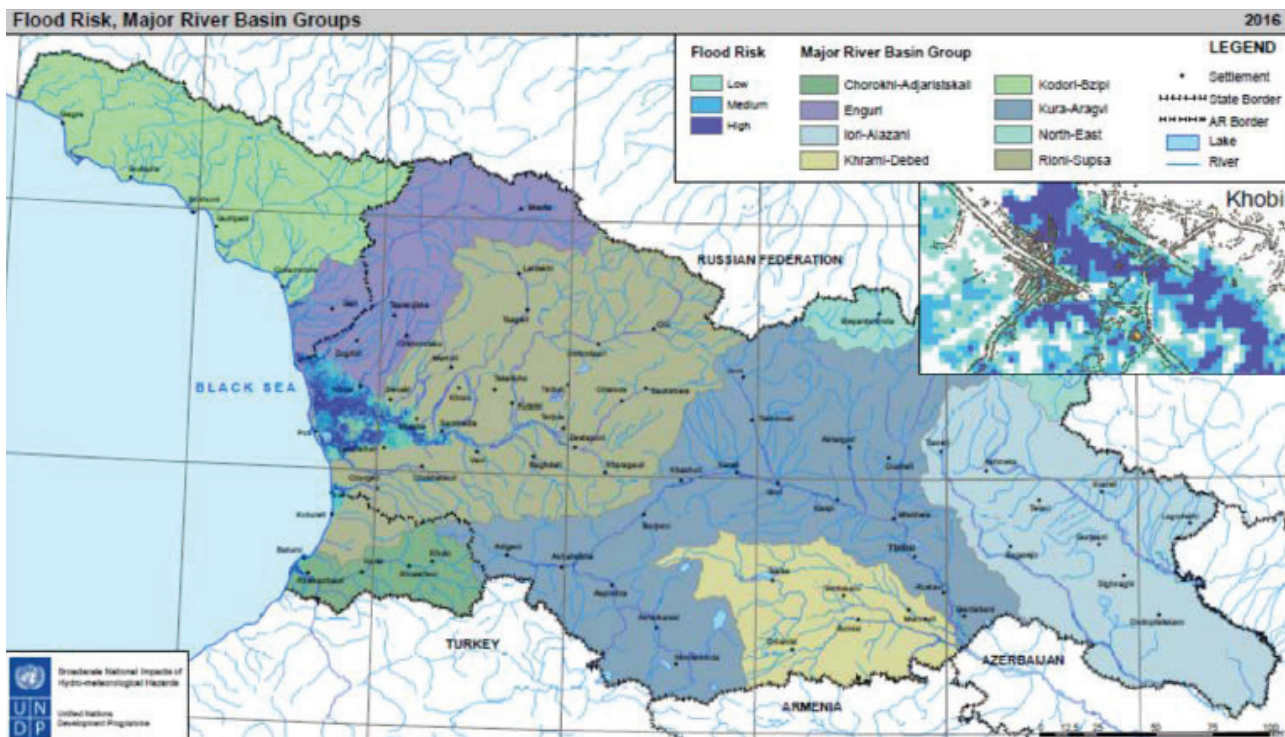


Figure 2. Flood hazards of major river basins and Khobi insert (Source: UNDP/SDC/GCF MHEWS project feasibility study)

According to the Third National Communication (TNC) for Georgia, the number of recorded floods during the period of 1992-2013 doubled compared to 1960-1991. Until 1995, floods occurred on average three to five times per year and varied between two to 20 times per year after 1995. In 2007-2015, floods increased to between seven to 20 occurrences per year.

Droughts. In Georgia, Kvemo Kartli, Shida Kartli and the southern municipalities of Kakheti regions are highly susceptible to droughts. Samtkhe-Javakheti is also prone to milder droughts. The drought cycle for Georgia has changed from 15-20 years to five years within the period from 1995 to 2015. In recent years (2008-2015) the maximum duration of droughts did not exceed 3.6 months. However, the extreme drought of 2000 lasted nearly six months. Overall, compared to the 1995-2007 period, 2008-2015 was characterized by longer droughts (0.17-month increase).

Hailstorms. Hailstorms occur across the entire country, with the intensity and frequency of the hail

higher in East and Southeastern Georgia compared to that of West Georgia. The most intensive hailstorms were observed in 1983, 1987, 1993 and 1997. According to data from the NEA, the frequency of 10-year average annual number of hailstorms increased from nine events in 1995-2004 by 62% to 15 events in 2005-2014.

Avalanches. Over 50% of the national territory, within which are found over 100 settled areas, is prone to avalanches. Since 1970, an increase in frequency and intensity of avalanches has been observed. Large slides were recorded during the winters of 1970-1971, 1975-1976, 1986-1987, 1991-1992, 1996-1997 and 2004-2005. The areas of Svaneti, Mountain Adjara, Tusheti, Kazbegi and Dusheti districts were significantly damaged and 176 human casualties were recorded. Over the period from 1970 to 1987, more than 20,000 people were left homeless. The year of 2014 was marked by an extremely high number of avalanches – 23 in total and four human casualties were recorded.

Windstorms. Strong winds are recurrent in the Caucasus ridge zones, Kolkheti lowlands, Zemo Imereti, Shida Kartli, Tbilisi, Gare Kakheti and Samtskhe-Javakheti regions. In 1995-2006, the frequency of strong wind events varied between one to four times per year. From 2007 to 2009, it increased to six-twelve times per year.

2.3.3 Geological hazards

Landslides. Most of mountainous regions of the country are naturally prone to frequent and intensive landslides, with large territories in the Imereti region, Tsageri, Oni and Ambrolauri municipalities of Racha-Lechkhumi and Kvemo Svaneti region, the mountainous zones of Adjara, Guria, Aphkhazeti and Mtskheta-Mtianeti regions and part of Akhmeta municipality, Kakheti region, being highly susceptible to this geological hazard. There are around 53,000 landslide bodies and sites of their possible formation. In general, around 70% of the country's territory, 3,000 settlements (62% of total) and 400,000 households are under the potential risk of geological disasters. Also, 14.2% of agricultural lands are seriously damaged by geological processes and require conducting of major protective measures and 13.1% of agricultural lands are located within the high-risk area. In accordance with NEA records, in recent decades landslide processes have accelerated significantly, due to increased precipitation and humidity, and have increasingly deviated from multi-year average values. In the year of 2017, over 2.7 times more annual landslide occurrences were recorded as compared to data from 2008. During 1995-2017, in total 49 human deaths were recorded.

Debris/Mudflows. Mostly characteristic to the southern slopes of the Greater Caucasus, particularly the east and southeastern parts of the Alazani River basin, including its mountainous tributaries, Central Caucasus and Gombori Range including Akhmeta, Telavi, Sagarejo, Gurjaani, Kvareli, Sagarejo, Lagodekhi, Khvareli, Signagi municipalities in Kakheti region, Kazbegi, Dusheti and Mtskheta municipalities in Mtskheta-Mtianeti region, Mestia municipality of the Samegrelo-Zemo Svaneti region, Lentekhi, Oni municipalities of Racha-Lechkhumi and the Kvemo Svaneti region and Tbilisi city. In the year of 2016, over 1.6 times more annual debris/mudflow occurrences were recorded as compared to data from 2008. During 1995-2017, in total 94 human deaths were recorded.

Rockfall/Rock Avalanche. 50% of the country's territory is characterized by more than 200 incline slopes, and slopes are mainly built on rocky and semi-rocky layers. Therefore, active gravitational processes - rock fall and rock avalanches - are observed almost everywhere. Such processes are particularly intensive during the winter and spring seasons, and the population and infrastructure in the mountainous regions are always within the risk zone.

Since the 1990s, geodynamic processes have intensified in comparison to multi-year average values. More than that, extreme/catastrophic landslides and debris/mudflows have become more frequent. The years 2003-2005, 2008-2011, 2012-2014 and 2015 were marked with extreme landslides and mudflows, with the situation aggravated in Svaneti, Racha-Lechkhumi, Mtskheta-Mtianeti, Tbilisi (Vere River disaster) and mountainous Adjara and Kakheti. The areas of Shida and Kvemo Kartli face a medium-level risk from geological hazards.

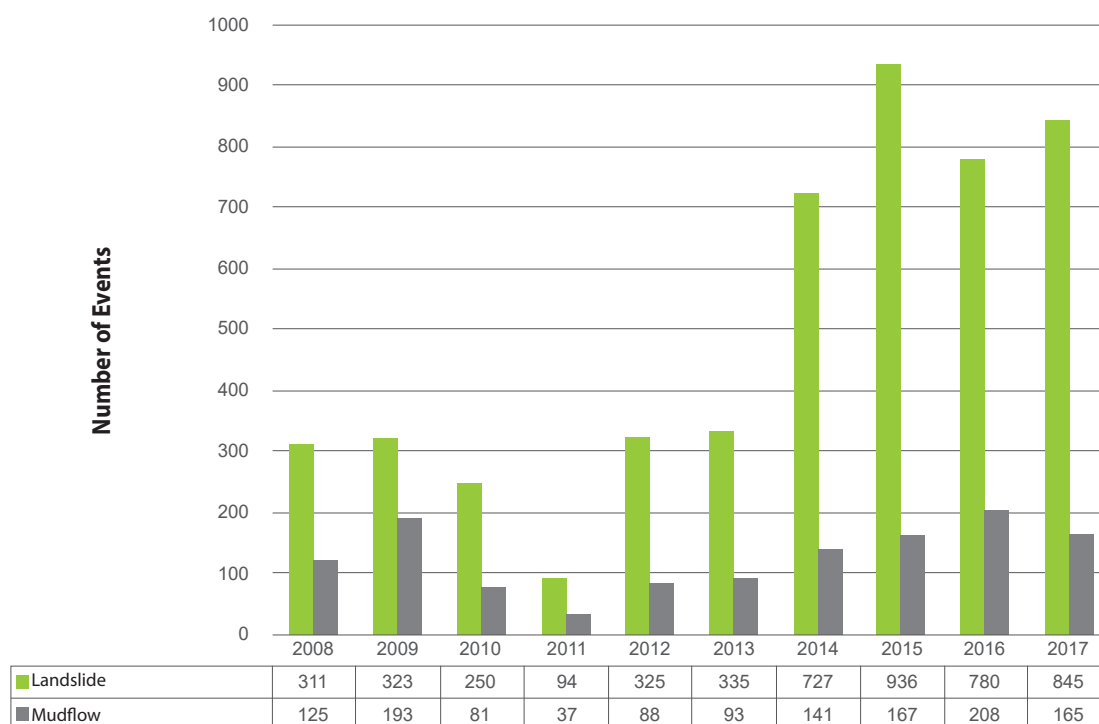


Figure 3. Recorded Landslide/Debris/Mudflow Hazards in the Territory of Georgia (2008-2017), NEA

2.4 Climate Change profile¹¹

2.4.1 Current CC trends and predictions

Temperature. Climate change assessments conducted in Georgia under the Third National Communication (TNC) to UNFCCC, covering the period of 2009-2011, revealed that during the last 50 years average annual temperature has increased, with the maximum increase in average annual temperature observed in Dedoplistskaro (0.70°C), Kakheti region, between the periods 1961-1985 and 1986-2010. The maximum increase in West Georgia was observed in Poti (0.60°C). A relatively small but important warming trend was revealed in the Mtskheta-Mtianeti and various parts of the Kakheti region. According to predictions, by 2050 as compared to 1986-2010, warming will mostly occur in the coastal zone and mountainous regions of West Georgia, particularly in Adjara. According to forecasts, Sachkhere in the Imereti region will have the largest annual average temperature increase (2.10°C), followed by the Adjara coastal zone and the Goderdzi Pass (mountainous Adjara and Samtskhe-Javakheti). The lowest increase (0.90°C) is expected in Poti, Samegrelo-Zemo Svaneti and Pasaunauri, Mtskheta-Mtianeti. The largest increase in temperature by 2071-2100 is expected to be in Batumi – up to 4.20°C. In Sachkhere, Imereti, Ambrolauri, Racha-Lechkumi region and Mestia, Upper Svaneti region, temperatures will rise by 3.70°C. Other territories will face lower increases but still by more than 30°C. In this regard, Poti is an exception, where the temperature is expected to rise by 2.90°C.

Although between the two observation periods warming has been more intensive in Eastern Georgia, the average annual temperature is warmer in Western Georgia. This picture will be maintained in the future as well, since in the current century intensive increases will take place in the West. With an average annual temperature of 14.90°C, the hottest station in all of Georgia was and still is Kutaisi, which by 2100 will be surpassed by Batumi – with an average annual temperature 19.40°C. While the coolest station is Goderdzi Pass, with the average annual temperature of 2.60°C, this will continue in the future, but the average annual temperature will increase to 7.5 0°C, nearly a tripling compared with today.

¹¹ Source: Feasibility study. Annex II, GCF project: Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia.

Annual Sums of Precipitation. In general, between the two observation periods (1961-1985 and 1986-2010), precipitation has increased in most regions of Western Georgia, except for Goderdzi pass, and decreased in Eastern and Southern Georgia by 6-8%, except for Pasanauri, where the opposite trend was observed. According to the predictions, until 2050 a steady increase in annual sums of precipitation is anticipated in Western Georgia, while between 2050 and 2100, a 10-20% decline of this value is expected across the country, particularly in Samegrelo, Kvemo Kartli and Kakheti (22%). The central part of the Likhi range will be an exception, where a 93% increase in annual precipitation is projected. The highest amount of precipitation (2300 mm and more) will be observed in the Adjara coastal zone. In the eastern parts of the country, Mount Sabue (1,101 mm) in Kvareli municipality will remain the most humid area. Overall, Kvareli, Lagodekhi and Pasanauri areas will continue to stay relatively humid as compared to other areas of Eastern Georgia, and Kvemo Kartli will remain the driest area.

Seasonal trends and predictions for temperature and precipitation. In winter, a warming trend has been revealed for the 1986-2010 observation period in Eastern Georgia. In contrast, at 10 stations of Western Georgia a cooling trend has been observed. For most of the country winter precipitation has increased by 10%. In future, all current cooling trends will change to warming, including in Gali and Lentekhi, where decreasing trends were revealed before. Warming of winter is projected to be more pronounced in Western Georgia, which may have an impact on the pace of the snow melt and ultimately on floods and flash floods. By the end of the century, winter will be 0.40°C warmer in Western Georgia. The entire country will be warmer by 1.30°C on average in winter and sums of winter precipitation will continue to increase by 2050. By 2100 the rise in temperature will be 3.20°C and the trend of increasing precipitation will be reversed. Only five stations in Dedoplistskaro, Akhaltsikhe, Tsalka, Sokhumi and Lentekhi offer data seeming to demonstrate that winter precipitation will continue to increase by the end of the century. At other stations the change varies between different periods.

In spring, there is a trend of warming, which is more intensive in Eastern Georgia than in the West. The largest increment by 2050 will be 2.60°C, while by 2100 it will reach 4.0°C. There is a sustainable trend of increasing spring precipitation by 5-28% in Western Georgia. In the future (by 2100), this increasing trend will be reversed. The trend will be maintained only on Goderdzi Pass.

From 1961-2010 almost all of the country experienced stable warming of summers. At 23 stations of Eastern and Western Georgia, the temperature increased up to 10°C during the past 50 years. As for precipitation, a sustainable decreasing trend was observed only at three stations (Bolnisi, Goderdzi Pass and Mta-Sabueti). In the future, the rise of summer temperatures will persist everywhere and reach the highest value of 4.70°C, while in the middle of the century total precipitation will increase in most of the country, including the stations demonstrating decreasing trends before. After the 2050s until the end of the century, the increase of summer precipitation will gradually decline, and for the majority of stations will demonstrate values below those existing in the observation period.

In autumn, temperature and precipitation have been increasing and will continue to increase across Georgia. In terms of precipitation, some stations stand out as exceptions (Gori, Tskhinvali, Tsalka, Mta-Sabueti, Pskhu and Goderdzi Pass). For the period 2021-2050 the warming will still continue, and precipitation will increase together with temperature, but this pattern will be altered by intensive warming and decrease of autumn precipitation by 2100.

Changes in extreme parameters. Based on the analysis of the two observation periods of 1961-1985 and 1986-2010, a reduction of the number of frosty days (IDO) took place throughout the country in the second period of observation. However, the trends are not sustainable. In the future, the number of frosty days will decrease along with the increase in the average temperature. However, the risk of frosty days will still exist in the lowlands of Georgia by the 2050s in winter and especially in spring. By the end of this century, frosty days will be characteristic mainly of highland areas.

The number of frosty nights has been decreasing more rapidly than that of frosty days. By the 2050s, this event will become slightly more frequent in transitional seasons at lowland stations in both Eastern and Western Georgia. By the end of the century, the risk of such cases will be halved for the

highland areas of Eastern and Western Georgia, while in the lowlands of Western Georgia it will be reduced by 70%.

The number of hot days (SU25) increased on the territory of Georgia between the two observation periods (1961-1985 and 1986-2010). The increase is more evident at lowland stations, where the number of hot days increased by 15%. In autumn, the increase is more intensive than in spring. By 2021-2050, the increase in the number of hot days will be less intensive at lowland stations than in the current observation period. At the majority of stations of Kakheti, Kvemo Kartli and lowlands of Western Georgia (except Batumi and Chakvi), this number will decrease, mainly in summer. At mountain stations, this value in some cases will increase by 100% (Tsalka, Pasanauri, Ambrolauri, Goderdzi Pass). By the end of the century, the average annual number of hot days will increase by 50 days at all stations. The exception is Ambrolauri, where this value is projected to increase by 110 days in the period of 2071-2100.

The TR20 (tropical nights) index has increased increasing across the entirety of Georgia. This change is especially significant (≈ 1.5 -times) for lowland stations. In transitional seasons, this parameter is observed only at lowland stations and is more intensive in autumn. In 2071-2100, the TR20 index will increase across the whole territory of Georgia by a factor of three, compared to the 2050s. This parameter is observed in all seasons except for winter, but not at highland stations. Together with the increase of the TR20 index and decrease of FD0, the increase of minimal temperatures for the entire country are also observed and predicted.

At present, as compared to 1961-1985, the maximum amount of precipitation falling continuously during one and five days decreased at half of the stations in Eastern Georgia, with the exception of Telavi and Sagarejo where these parameters increased. In Western Georgia, observed and predicted changes in one and five-day precipitation have a contradictory nature. The trend for Sokhumi and Ambrolauri shows an increase in both parameters. By the period of 2021-2050, the maximum precipitation in one day will increase along the entire sea coastal area (except Poti), Adjara and Samegrelo, while an increase in the amount of maximal five-day precipitation is expected in Zugdidi (Samegrelo) and the surroundings of Gali (Abkhazia). In these regions an increase in flash flood/flood risk is expected. In 2071-2100, both of these parameters will be decreasing in most of the country; however, they will be increasing in Kvareli and Lagodekhi (Kakheti region), as well as in highland areas of Georgia, where the risk of flash floods/floods is high. In Western Georgia/Samegrelo, the risks associated with maximal one day precipitation will continue.

According to the observed data, the number of days with extremely abundant precipitation is slightly decreasing in Eastern Georgia, proven by the trend in Tskhinvali and Mta-Sabueti. In the lowlands of Western Georgia, these parameters mostly increased between two observation periods (1961-1985 and 1986-2010). Rising trends of the number of days of 50 mm rainfall or more are observed in Poti, Keda and Ambrolauri. The number of days with more than 50 mm rainfall will decrease across almost all of Eastern Georgia by 2050, and will remain invariable until the end of the century. In Western Georgia, a reduction is expected for mountain areas, while in the coastal region the number of such days will increase. An increase in the number of days with more than 90 mm precipitation is expected by 2050 and then it will decrease slightly; however, it will still be more than during the observation period.

2.4.2 Climate change impacts on natural hazards and vulnerability¹²

Climate change impacts on natural hazards. Data recorded in the national hazards database of the NEA strongly indicates the increased frequency and intensity/severity of climate-induced natural hazards and associated damages over the past decades. Moreover, Georgia's SNC and TNC to UNFCCC as well as other studies provide evidence that further escalation of observed ongoing geological and hydrological-meteorological processes is expected until 2050. The climate change

¹² Source: *Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia. UNDP Funding Proposal to the Green Climate Fund. 8 February 2018*

scenarios indicate more extremes, such 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 temperatures for all seasons, decreasing precipitation and longer duration of dry periods, which will persist until 2050 for already dry areas, will further increase the risk of droughts. Currently, the number of days with precipitation of more than 50 mm and 90 mm rainfall will decrease in almost all of Eastern Georgia by 2050. In the lower courses of the Alazani and Iori River Basins, located in the south and south-eastern municipalities of the 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 dominant trend will be towards prolonged droughts rather than towards wet periods. Therefore, dry areas of the country already affected by climate change will become even more vulnerable. More specifically, Kvemo Kartli will remain the driest region, as it is now. The southern and southeastern municipalities (Sagarejo, Dedoplistskaro, etc.) of the Kakheti region and Shida Kartli which are also prone to droughts will continue to be susceptible to this phenomenon.

Population vulnerability. Over the last two decades, 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 caused 60% of these damages/losses and 67% of loss of life. National disaster statistics indicate that there is a growing trend in cumulative damages and loss of life from floods, droughts, avalanches, windstorms and hailstorms over the last 20 years. The damages from single extreme events range from over 300 million GEL (121 million USD,) which was attributed to the 2000 extreme drought, to 700 million GEL (283 million USD) attributed to the 1987 flood. In addition, natural hazards have resulted in internally displaced eco-migrants from economically disadvantaged areas.

An economic assessment of the impact of hydrometeorological hazards under climate change conditions 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 (51.2 million USD) without climate change and at 282.7 million GEL (124.4 million USD) 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 damage costs to agriculture from flooding alone would be 126.3 million GEL (55.6 million USD) and 154.2 million GEL (67.8 million USD) under baseline and climate change conditions respectively.

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 Adjara and 47% in Guria are at low risk. Risk for the other regions is largely balanced across the three regions. Under climate change scenarios, those at medium risk will tend towards high risk over time, especially in Western Georgia where it is conjectured that, with the exception of Adjara, around two-thirds of the flood plain population (again, in Western Georgia), will be subjected to higher risk.

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; this rises to almost three-quarters under climate change. The 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 appears to be at risk from drought both currently and into the future. Some 83,633 ha of agricultural land are currently affected by severe drought conditions, with a potential to rise to 149,302 ha. Almost 100% of this land is currently in the Kvemo Kartli region, though in the future some 14,016 ha could be affected in Kakheti, (primarily a wine producing region), which would constitute an 18-fold increase compared with today.

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 agricultur-

al land affected by severe hailstorms is currently in Kvemo Kartli, though future climate change will potentially increase the area of land affected by over three-fold, with Kvemo Kartli joined by Samgerelo-Zemo Svaneti as the most severely affected regions.

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 are subject to the most severe risk conditions, roughly split between Racha-Lechkumi-Kvemo Svaneti and Shida Kartli. However, in the future almost 60% of risk from severe wind will be within Imereti, where the risk now is negligible.

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

In general, around 70% of the country's territory, 3,000 settlements (62%) and 400,000 households are subject to risks from geological disasters. Some 14.2% of agricultural lands have been seriously damaged by geological processes and require conducting of 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 Adjara, Mtskheta-Mtianeti and Racha-Lechumi-Kvemo Svaneti, each with a little over 10% of Georgia's total.

3.0

Legal-regulatory and policy framework for CCA/DRR

3.1 Climate Change Adaptation

3.1.1 Legal-regulatory framework

International commitments. Georgia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1994, acceded to the Kyoto Protocol in 1999 and acceded to the Copenhagen Accord on 31 January 2010. The latest step of the country towards meeting its commitment under the UNFCCC was the signature of the Paris Agreement on 22 April 2016, following the submission of the Intended Nationally Determined Contribution (INDC) to the convention's secretariat.

As part of its commitments to the UNFCCC Georgia, as a non-annex I country, regularly submits its national communications (NCs) to the Convention's Secretariat through GEF-funded enabling activities and projects implemented by UNDP, outlining local climate change trends and developments. To this end, it has prepared and submitted three NCs, with the latest one developed in 2012-2015 and submitted to the UNFCCC in 2016. In addition to preparations and submissions of NCs, as part of its non-Annex I country obligation determined by Decision 2/CP.17 of the Addendum to the Conference of the Parties on its Seventeenth Session (FCCC/CP/2011/9/Add.1), Georgia has recently finished its First Biennial Update Report (BUR) submitted to the UNFCCC in June 2016. Furthermore, in an agreement with the MoEPA, UNDP assisted in preparation of a joint Second BUR and fourth NC PIF and project document, submitted to the GEF secretariat and received an endorsement of it. The project

started in 2017 and will last until 2021. It focuses on eliminating capacity and information gaps for UNFCCC reporting and improving the enabling environment for climate adaptation.

Sustainable Development Goal (SDG) 13 is dedicated to climate change and calls for taking urgent action to combat climate change and its impacts. Following are specific targets to achieve the given goal, relevant for developing countries including Georgia:

- /// 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries;
- /// 13.2 Integrate climate change measures into national policies, strategies and planning; and
- /// 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

The EU Georgia Association Agreement (EUAA)¹³ and in particular its articles 308 and 310 call for development, research and diffusion for adaptation technologies; integration of CCA into development and sectoral policies and development of a National Adaptation Programme of Action (NAPA).

National legislation. There is no specific law solely dedicated to climate change. Various issues of CCA are regulated by a number of laws and sub-laws. More specifically, The Law on Environmental Protection (1996) as amended on 07/12/2017¹⁴ defines key environmental competencies and areas of actions, including the actions in the area of climate change. It tasks the MoEPA with organizing measures on climate adaptation and mitigation, as well as with setting up and coordinating operations of the system of environmental monitoring.

The Law of Atmospheric Air Protection (1999) as amended on 07/12/2017 mandates the MoEPA to coordinate development and implementation of the national climate change programme and action plan, as well as tasks the NEA to conduct regular climate change observations, analysis, prognosis and scientific research¹⁵.

3.1.2 Policy Framework

In April 2015, the government outlined its vision and a plan in its INDC statement, which covered adaptation measures using an ecosystems approach. The INDC states that the natural ecosystems approach is pivotal for its adaptation strategy and actions/contributions, and as a basis for development of the National Adaptation Plan.

The main objective of the Government of Georgia (GoG) as stated in the INDC is to improve the country's preparedness and adaptive capacity by developing climate-resilient practices that reduce vulnerability of highly exposed communities¹⁶. In this regard, Georgia takes steps to integrate climate risk and resilience into core development planning and implementation.

Georgia's agricultural sector plays a key role in the country's economy and is important to fulfil the fundamental needs of society: a safe, secure, and affordable food supply, thus underlining the importance of the relationship between climate change impacts on agriculture and food security. For the adaptation of the agricultural sector to anticipated climate change, a wide range of measures is planned. Those include, but are not limited to the following: (a) research and development for agriculture dealing with droughts, floods, etc.; (b) introduction of innovative irrigation management and water application techniques; (c) implementation of various site-specific anti-erosion measures; and (d) establishment of information centres for farmers that provides guidance on adaptive management of agriculture etc.

Establishment of early warning systems for climate-related extreme events is also considered as a

¹³ EUAA entered into force in July 2016 with substantial parts provisionally applied since 1 September 2014

¹⁴ Source: <https://matsne.gov.ge/ka/document/view/33340>

¹⁵ Source: <https://matsne.gov.ge/ka/document/view/16210>

¹⁶ GEORGIA'S INTENDED NATIONALLY DETERMINED CONTRIBUTION SUBMISSION TO THE UNFCCC

priority measure by the GoG. The INDC refers specifically to all of the hazards identified within the context of extreme natural events aggravated by climate change, and identifies agriculture, coastal zones, the tourism sector's development, forestry and the health sector as at-risk sectors. The document also identifies key actions and institutional measures for CCA in the above-mentioned sectors (MoENR 2015b). According to the Georgia INDC, estimated economic losses without adaptation measures during 2021-2030 will be about 10-12 billion USD, while adaptation measures will cost between 1.5-2 billion USD. As stated in the INDC, 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 of Georgia's capacities, in particular: (a) national capacity to develop adaptation strategies; (b) policy-makers capacity for CCA planning; (c) capacity of communities to reduce their vulnerability to adverse impacts of future climate hazards; and (d) capacity of national health system institutions to respond to and manage long-term climate change-sensitive health risks.

It is fundamental to incorporate a gender- and human rights-sensitive approach in adaptation planning capacity building, prioritizing the most vulnerable sectors and regions in order to reduce social inequality and the gap between the rights of women and men.

Georgia has also committed to developing a NAPA when it signed its Association Agreement with the EU (EU 2014b). In 2016, the NAP roadmap was developed for Georgia under USAID/NALAG project "Institutionalization of Climate Change Adaptation and Mitigation in Georgian Regions". Under this project, the sensitivity of various economic sectors to climate change at municipal level was assessed and related thematic maps developed. Based on these assessments, adaptation recommendations were developed¹⁷. Furthermore, preparation of NAPs for various economic sectors and ecosystems is partially addressed by the ongoing UNDP/GEF "Second Biennial Update and Fourth National Communications" project. In 2017, the NAP for the agricultural sector was elaborated and endorsed by the GoG.

Currently, the TNC to the UNFCCC remains the most up-to-date and comprehensive climate change policy document for Georgia, although it is not formally reflected in a national legally binding commitment, but remains a stand-alone document used by non-governmental stakeholders when elaborating or implementing their actions, but which the authorities at national, regional or municipal levels rarely consult in their activity planning. The FNC focuses on removing legal-policy and institutional barriers towards better integration of CCA into development and sectoral policies and programmes.

3.1.3 Sectoral strategies

General socio-economic development strategy. The Georgian Socio-economic Development Strategy 2020 states that: "Due to the fact that Georgia is one of the most sensitive places among the world's mountainous regions in terms of natural disasters, it is necessary to decrease the natural disaster risk, avoid loss of lives from such disasters and eradicate their negative results (damage to roads, bridges, industrial or residential premises and other infrastructure)" (GoG 2014). The Strategy considers the UNFCCC mechanisms to support problem solving, and also other CCA instruments, as potential sources of funding.

Basic Data and Directions. The Basic Data and Directions (BDD) adopted in 2018 represents a mid-term expenditure framework of Georgia (2018-2021). It outlines major environmental strategic directions for the next four-year period, including:

- /// Expansion of the hydrometeorological observation network and improvement of a relevant database;
- /// Improvement of weather and hydrological forecasting;

17 Source: The Georgian Road Map on Climate Change Adaptation. Tbilisi, 2016. USAID/NALAG project: Institutionalization of Climate Change Adaptation and Mitigation in Georgian Regions. http://nala.ge/climatechange/uploads/RoadMap/TheRoadMapEngPre-design_reference191_Final.pdf

- /// Preparation and timely dissemination of effective early warning for hydrometeorological hazards;
- /// Spring-fall geological monitoring, assessment of geological processes under force-majeure situations and preparation of annual bulletins;
- /// Geological hazard mapping for Tbilisi; and
- /// Conducting of a geological survey.

An estimated annual budget for the above activities is 9,433,000 GEL.

National Environmental Action Programme (NEAP). The NEAP-3 for 2017-2021 approved by the GoG sets long-term goals and shorter-term objectives for priority environmental areas, as well as outlines the actions to be implemented during the programme period. Under the climate change section, the goal is to reduce greenhouse gas (GHG) emissions and ensure the safety of the Georgian population through the implementation of CCA measures. To this end, immediate objectives related to CCA are: i) an increase in the adaptation potential of the country (objective 2); and ii) meeting reporting obligations under the UNFCCC (objective 3). Concrete actions for 2017-2021 are as follows:

- /// Development of a National Adaptation Plan (NAP) for 2021-2030 (implementation period – 2017-2020);
- /// Development of a Nationally Determined Contribution (NDC (implementation period – 2017-2019);
- /// Establishment of a multi-hazard early warning system and use of climate information (implementation period – 2017-2021); and
- /// Preparation of a FNC under UNFCCC (implementation period – 2017-2021).

National water strategy and river basin plans. According to the draft Law on Water, which is largely based on the EU Water Framework Directive (WFD) and is planned to be officially adopted in 2018, the Ministry of Environment and Natural Resources Protection (now the MoEPA) through its Water Resources Management Service (currently Water Division) is required to develop a National Water Strategy. This strategy may take into consideration climate impacts as well as river basin plans for major river basin districts, including Central Kura, Ktsia-Khrami (same as Khrami-Debed), Alazani-Iori, Enguri-Rioni and Chorokhi-Adjaristskali River Basin Districts. The latter was developed with the EU regional river basin project's support, while the river basin plans for Khrami-Debed and Alazani-Iori will be developed under ongoing EU Water Initiative+.

Although the WFD does not explicitly discuss climate change and adaptation, it requires relevant authorities to take into consideration other important EU directives, such as for example, the EU Flood Directive, the EU Water Scarcity and Droughts Strategy, while also planning measures to address various pressures and risks to water bodies. Moreover, river basin management planning makes it possible to adaptively manage climate change impacts - scale up or down our response to climate change in accordance to monitored data, and avoid over-investment or under-investment. On the other hand, it is important that long-term climate projections are built into the design of measures (driven by current pressures) that have a long design life and high costs. Thus, inclusion of climate change in assessment of pressures is important. More than that, the river basin management planning process is the best mechanism through which to balance available water resources and demands, thus avoiding long-term water scarcity, and provides clear links to the management of flood risks in catchments, which is specifically addressed through requirements in the Floods Directive.

The WFD has a guidance document #24 specifically dedicated to river basin management under a changing climate that can be applied during the process of river basin planning. Moreover, currently a sub-law of flood management (flood impact assessment and management) based on the EU Flood Directive is being developed, which will be finalized by the end of 2018.

Regional development strategies. Currently, there is a new planning cycle for the regional development strategy to cover the 2018-2021 period. The process is supported by the EU Delegation to Georgia and implemented by a consortium led by GFA Consulting Group GmbH in a partnership

with GIZ and Altus. The draft document of the Regional Development Programme has already been elaborated, one of whose major priorities is the Improvement of key infrastructure supporting competitiveness and environmental sustainability of the country and its regions (priority 1). Under this priority, among various actions, improvement of environmental infrastructure including DRR infrastructure is also envisaged (action 1.5)¹⁸.

Apart from the umbrella programme, all administrative regions of Georgia have their regional development strategies for 2014-2021, where the development of regional climate adaptation plans is included as one of the priority actions.

Currently, the national programme for the development of the mountainous regions is being implemented. The multi-stakeholder national council coordinates the process. For the implementation of planned actions and various mountain-related programmes, a special fund was established under the Ministry of Regional Development and Infrastructure (MRDI), with a 20 million GEL annual budget. Of this amount, around 10 million GEL is allocated for local infrastructure development, including disaster/climate risk reduction infrastructure.

Forestry. The National Forest Concept for Georgia (GoG 2014c) was approved by the Parliament as the basis for elaboration of both new legislation and policy for forest management in the country. Particular actions which can support Georgia's forest adaptation to global warming as covered by this concept can be summarized as follows:

- // Commissioning of an assessment of climate change impacts on forest areas, including impacts on the goods and services provided by forests;
- // Supporting a national dialogue on possible adaptation strategies;
- // Categorizing forest stands according to forest composition and vulnerability to climate change and elaborating sustainable management guidelines, including adaptation measures, for each forest type;
- // Implementation of adaptation plans for climate-vulnerable forest stands; and
- // Equipping forest management bodies and forest users with the best methods for carrying out vulnerability assessments.

It is worth noting that no specific actions to protect mountain forests are being promoted by the concept.

Analysis of forest programmes revealed that Georgia is missing comprehensive and evidence-based research on the vulnerability of forest ecosystems to climate change, in order to plan further detailed and complete actions to increase the resilience of its forests.

Agriculture and rural development. The Agriculture Development Strategy of Georgia for 2015-2020 is divided into strategic directions and measures. In the Strategic Direction: Climate Change, Environment and Biodiversity, the document envisages:

- // Creation of a gene bank for the conservation of agro-diversity and endemic species, and thus increasing agricultural sector resilience to climate change, especially in arid and semi-arid zones, and in general; and
- // Promotion of climate smart agriculture (CSA) practices in agricultural production to ensure economic and social welfare of farmers and other types of vulnerable groups.

It states: "it is important to promote a Climate Smart Agriculture approach that simultaneously addresses three intertwined challenges: ensuring food security through increased productivity and income, adapting to climate change and contributing to mitigation of climate change". This measure promotes strong coordination of action among different stakeholders, including government institutions, local authorities, NGOs and private sector representatives, to develop relevant national and municipal programmes. As well as development of capacities and introduction of relevant technolo-

18 Source: http://www.regpol.ge/images/Short_Version_of_the_Regional_Development_Programme_of_Georgia_2018-2021.pdf

gies, it envisages research to ensure increased agricultural production resilience to climate change impacts. Moreover, climate change is mainstreamed under other strategic directions and measures such as the reduction of soil degradation and desertification processes.

According to the Strategy, to define and support rural development and investment strategies for each region, the Ministry of Agriculture (currently, MoEPA) shall collaborate with other entities and local authorities to draft a rural development policy, which, in turn, shall be based on local, social, economic and cultural specifications. A unified action plan shall be developed incorporating short, medium and long-term measures.

As part of the state agriculture strategy, by two #305 (2015) and #1462 (2014) governmental resolutions, an agro-insurance subsidy was introduced, which enables farmers to ensure agriculture crops from natural hazards, such as hailstorms, flooding, wind storms and frost¹⁹.

With assistance of the UNDP/EU ENPARD II project, Georgia has adopted a Rural Development Strategy for 2017-2020, which among other issues/areas considers sustainable natural resource management, including CCA and DRR as one of the top priorities for rural development of the country.

Energy. The energy sector development and regulation in Georgia incorporate laws and strategies on conventional and alternative/renewable energy sectors. Some of them recognise climate change as a phenomenon and promote action to mitigate climate change, but none of them consider the reverse effect of climate change on renewable energy sources and/or on physical infrastructure, nor potential heating or cooling demands caused by climate change. CCA measures within the energy sector remain underdeveloped.

Urban planning. The urban planning process in Georgia is decentralized. The central government through the MRDI is responsible for development of legislation regarding spatial-territorial planning. Local governments are mandated to develop their spatial development and land-use plans. Currently, a nation-wide spatial planning strategy is being developed that will be based on seismic hazard assessments. Building codes and regulations from the Soviet era are still valid in Georgia. In 2013, the Government adopted a decree to recognize technical regulations enacted in OECD countries. The government, however, is working on adoption of EU building codes based on the unified national set of building regulations, including setting up enforcement, monitoring and control mechanisms.

Environmental Education. Currently a new environmental education strategy with associated action plan is being elaborated under the leadership of the EIEC in a partnership with the MoESCS (former Ministry of Education and Science) and other line Ministries to cover the period from 2018 through 2020. It is expected that CCA will continue to be one of the top priority areas for environmental education.

3.2 Disaster Risk Reduction

3.2.1 Legal-regulatory framework

International commitments. For DRR, there is no UN convention that obliges any its parties to carry out certain DRR support measures. However, there is a UN Framework on DRR, led by the United Nations Office for Disaster Risk Reduction (UNISDR), which Georgia takes part in. This is known as **The Sendai Framework for Disaster Risk Reduction 2015-2030**, adopted at the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan, on 18 March 2015²⁰. The Framework replaced the previous Hyogo Programme covering the period from 2005 to 2015. It outlines seven clear targets and four priorities for action to prevent new and reduce existing disaster risks:

- /// Priority 1: Understanding disaster risk - Policies and practices for disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment. Such knowl-

¹⁹ <http://apma.ge/projects/read/agroinsurance/4:parent>

²⁰ Source: https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf

edge can be leveraged for the purpose of pre-disaster risk assessment, for prevention and mitigation and for the development and implementation of appropriate preparedness and effective response to disasters.

- /// Priority 2: Strengthening disaster risk governance to manage disaster risk - Disaster risk governance at the national, regional and global levels is of great importance for an effective and efficient management of disaster risk. A clear vision, plans, competence, guidance and coordination within and across sectors, as well as participation of relevant stakeholders, are needed. Strengthening disaster risk governance for prevention, mitigation, preparedness, response, recovery and rehabilitation is therefore necessary and fosters collaboration and partnership across mechanisms and institutions for the implementation of instruments relevant to disaster risk reduction and sustainable development.
- /// Priority 3: Investing in disaster reduction for resilience - Public and private investment in disaster risk prevention and reduction through structural and non-structural measures is essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment. These can be drivers of innovation, growth and job creation. Such measures are cost-effective and instrumental to save lives, prevent and reduce losses and ensure effective recovery and rehabilitation.
- /// Priority 4: Enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction - The steady growth of disaster risk, including the increase of people and assets’ exposure, combined with the lessons learned from past disasters, indicates the need to further strengthen disaster preparedness for response, take action in anticipation of events, integrate DRR in response preparedness and ensure that capacities are in place for effective response and recovery at all levels. Empowering women and persons with disabilities to publicly lead and promote gender-equitable and universally accessible response, recovery, rehabilitation and reconstruction approaches is key. Disasters have demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of a disaster, is a critical opportunity to “Build Back Better”, including through integrating DRR into development measures, making nations and communities resilient to disasters.

An important international agreement containing Georgia’s requirements for some elements of DRR is the EUAA, which is a binding document for Georgia. Namely:

- /// Articles 376-379 of Chapter 22 call for bilateral cooperation between the EU and Georgia in the area of civil protection - exchange and regular update of contact details in order to ensure the continuity of dialogue, a 24-hour availability, and the facilitation of mutual assistance in case of major emergencies; exchange of information on providing assistance to third-party countries in emergencies where the EU Civil Protection Mechanism is activated; inviting experts to specific technical workshops and symposia on civil protection; inviting on a case-by-case basis observers to specific exercises and trainings organised by the EU and/or Georgia; and strengthening cooperation on the most effective use of available civil protection capabilities.
- /// Annex XXVI to the EUAA – Environment under the water resources section obliges the country to transpose and implement certain critical provisions (Articles 4,5,6,7) of Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks. Specifically, it requires Georgia to adopt national regulation on flood assessment and management, as well as implement such measures as preliminary flood assessment, flood hazard and risk mapping and development of flood management plans.
- /// Annex XVIII to the EUAA calls for establishment of early warning mechanisms for better prevention, preparedness and/or response to emergency situations, including exchange of early warning and updated information on large-scale emergencies on a 24-hour basis.

National statutory requirements. Disaster Risk Management (DRM) in Georgia is governed by the following laws and regulations:

- /// The 2004 Law of Georgia on Structure, Authority and Operational Procedures of the GoG as amended in June 2018, tasks the GoG with various state functions including ensuring environmental security and civil safety of the country.

- // The 2014 Organic Law on Self-Governing Bodies as amended on 01/06/2017 lists responsibilities of local authorities with regard to emergency situations, emergency preparedness and response etc.
- // The 2014 Law on Emergency Situations as amended on 07/12/2017 sets the legal basis for emergency management in Georgia. Its 2017 amendment reflects the recent institutional change of establishing the Emergency Management Service (EMS) under the Prime Minister's Office as a result of the merger of the State Security and Crisis Management Council (SSCMC) and the Emergency Management Agency (EMA) under the Ministry of Internal Affairs (MIA). Based on this amendment, the EMS is charged with organizing emergency prevention, preparedness, response, recovery and rehabilitation works within the realm of emergencies, as well as with implementing the state Civil Safety Plan. For the development of the Civil Safety Plan, the revised law stipulates establishment of an expert advisory panel. Furthermore, the change to the law stipulates creation of an inter-agency emergency management operational centre as a responsible body for organizing and coordinating response activities at the operational level. Until such a centre is created, the EMS and relevant response crew would implement the function of organizing and coordinating emergency response at the operational level.
- // The 3 May 2018 Law on Civil Safety requires the establishment of a unified emergency management system across the country, divides emergencies into two categories, and tasks the EMS with organizing and coordinating the functioning of a national emergency management system in Georgia etc.
- // The 2015 Law of Georgia on the Procedure of Planning and Coordination of National Security as amended in 2017 regulates the planning and coordination of national security of the country. The new law standardizes the national security policy planning and coordination processes. In addition, paragraph 20 point 1 of the law defines issues related to management of "all types of crisis situations in the area of national security and those threatening the state interests of Georgia". A crisis situation is said to occur when certain factors pose a significant threat to Georgia's state interests and there is a need to adopt political decisions of the Prime Minister. The National DRR Strategy and Action Plan development process was primarily based on the Law of Georgia on the National Security Policy Planning and Coordination. One of the strategic functions in this area is planning activities to avert hazards, risks and challenges related to crisis situations.
- // The 28 October 1997 Law on Non-military Alternative Service as amended on 07/03/2018 and effective from 1 June 2018 allows Georgian citizens who are obliged to take mandatory military services to choose non-military alternative service, including service in rescue and recovery operations during emergency situations. Stipulated by the Law on Military Reserve Force and Reserve Service, the 2018 amendment of this law envisages registration/enrolment of persons who served non-military service in Military Reserve force until the age of 60. Upon demand, such persons are recruited during wars and national emergencies to take part in military operations or in fire-fighting, rescue, recovery and rehabilitation works during major emergencies.
- // The Resolution #508 (24/09/2015) of the GoG on the Approval of National Civil Safety Plan of Georgia.
- // The Resolution #562 (25/12/2017) of the GoG on the Approval of the Statute of the Emergency Management Service of Georgia.
- // The Ordinance #558 (25/12/2017) of the Minister of Internal Affairs on the Approval of the Joint Operations Centre.
- // The Ordinance #4 (12/01/2018) of the Head of the EMS on the Approval of the Statute of the Emergency Management Service.
- // The Order #2-255 of the Minister of Environmental Protection and Agriculture of Georgia on Approval of the Regulations of the Legal Entity of Public Law - National Environmental Agency, dated 19 April 2018.
- // The Resolution #452 (06/10/2017) of the GoG on the Approval of the Rule on Preparing Emergency Management Plan.

- The Government Resolution #4 (11/01/2017) On Approval of National Disaster Risk Reduction Strategy of Georgia 2017-2020 and its Action Plan - National Disaster Risk Reduction Strategy of Georgia 2017-2020 (Annex N 1), its Action Plan (Annex N 2) and Annex of the Action Plan (Annex N 3) are approved in compliance with Article 5 of the Law of Georgia on the Structure, Authority and Rules of Operation of the Government of Georgia and Paragraph 15.4 of the Law of Georgia on the National Security Policy Planning and Coordination.

The newly-adopted Civil Safety Law serves to create a unified effective emergency management system, with the EMS becoming the major responsible body for emergency management, including disaster prevention, response, recovery and rehabilitation. Namely, the EMS is responsible for: i) developing civic safety and emergency management policies and coordinating their implementation; ii) registering and analysing disaster risks and maintaining a unified disaster/emergency management information system; iii) coordinating nation-wide emergency preparedness, response, recovery and rehabilitation activities; and iv) operating on a daily basis a Situation Room and activating it in case of national emergencies. The law also envisages establishment of an Inter-Agency Operational Centre based on the Prime Minister's Decree that should organize and coordinate emergency response at the operational level. Before the establishment of such a body, the EMS itself should perform such duties.

The law divides emergencies/disasters into natural and man-made emergencies/disasters and, based on the scale/importance of the emergency situation, classifies it either as a national emergency or a local emergency. A national emergency is a crisis situation that cannot be solved by one specific response team, is spread across many areas of the country and might have significant health, environmental and socio-economic impacts. A local emergency is a situation that is geographically confined to one municipality with potential local negative impacts, and which can be dealt with by one local response team of respective municipality or teams of adjacent municipalities. Categorization of an emergency as a nation-wide event is carried out through the government ordinance, based on the recommendation of the EMS.

Emergency management is carried out at political/strategic, operational and tactical levels. At the political level, nation-wide emergencies are directly managed by the Prime Minister, with the EMS's support. At the operational level, it is managed either by the EMS or the inter-agency operational centre to be established by the Prime Minister or authorized person's decision.

Local emergencies are managed either by the national emergency authority, when its response forces are sufficient for response and recovery, or by a local field emergency office when several forces are necessary for emergency management. Local emergency management functions can be transferred to local authorities which, among other issues, are responsible for developing municipal emergency passports (the same as threat assessments).

The law also introduces the concept of a volunteer force/corps, which has to consist of Georgian citizens, who should be registered in a volunteers' registry. Their work during response and recovery operations is reimbursed by the State. In order to strengthen such a corps of volunteers, the State should develop sports-health facilities in local response teams' locations.

Based on the new law, the structure of the EMS should be defined by EMS statute. The establishment of legal entities of public law under EMS is allowed. The new law requires the development of a National Civil Safety Strategy, and for this very purpose mandates the Prime Minister to set up an advisory board composed of scientists and experts in various DRM/DRR-related fields.

3.2.2 Policy and planning framework

BDD – contains priority objectives and actions for 2018-2021 in the area of CCA/DRR as outlined in paragraph 3.1.3 above.

INDC – contains a wide menu of actions for prevention, preparedness and response to climate-induced natural disasters and, in particular, improvement of hazard and risk knowledge, including

expansion and upgrade of the hydrometric network, establishment of a near-real-time early warning system, improvement of enabling environment and national and local capacities for DRR, including prevention, preparedness, response and rehabilitation, increasing resilience of local communities, awareness raising and education etc.

Draft Regional Development Programme – includes development of environmental infrastructure, including DRR infrastructure as one of the priority areas for intervention.

NEAP-3 – contains a long-term goal and two immediate objectives for reducing risks of natural disasters. More specifically, the long-term development goal under the DRR section is to reduce human deaths, negative impacts on health and ecosystems and economic damage. To this end, there are two concrete objectives to achieve the goal: i) improvement of hazard and risk assessment/analysis and monitoring system; and ii) establishment of a system for prevention of natural disasters and strengthening of preparedness to natural disasters. Concrete actions include:

► Objective 1

- *Renewal of hazard classification and risk assessment methodology (implementation period - 2017-2018);*
- *Development of legal framework for managing flood and flash flood risks (in line with the EU Flood Directive; implementation period - 2017-2019);*
- *Establishment of a system assessing and managing flood and flash flood risks (assessment of flood hazards and risks, hazard and risk mapping and preparation of plans for reducing flood risks; implementation period - 2017-2021);*
- *Renewal of the geological monitoring system for the city of Tbilisi (identification of hazards and hazard mapping; implementation period - 2017-2021);*
- *Preparation of large-scale GIS maps for geological hazards of Georgia (implementation period - 2017-2021);*
- *Establishment of GIS database on geological hazards (implementation period - 2018-2021);*
- *Development of GIS geological maps (implementation period - 2018-2021);*
- *Expansion of hydrometric network (implementation period - 2017-2020);*
- *Creation of electronic hydrometeorological database (implementation period - 2017-2020); and*
- *Establishment of short- to long-term drought forecasting and early warning system (implementation period - 2019-2021).*

► Objective 2

- *Cost-benefit analysis of prevention and mitigation measures for natural disasters (implementation period - 2017-2018); and*
- *Development of a master plan for protection, rehabilitation and spatial development of the Black Sea Coastal Zone (implementation period - 2017-2020).*

Major sources of financing for the above actions are given as: i) the state budget; ii) donors (mainly undefined); and iii) the EUD for developing flood risk assessment and management legislative basis.

National Civil Safety Plan of Georgia (2015) is a major policy document for the unified emergency management system, regulating activities of state, regional and local authorities in the area of civil safety. It defines:

- // protection measures for affected population and territories, their scale, implementation procedures and competent main and supportive authorities; and
- // rules and procedures for prevention, preparedness, response, recovery and rehabilitation works.

It is based on the emergency and risk management plans of individual entities of the unified system.

National DRR Strategy and Action Plan²¹ – includes national DRR goals, objectives, strategic priorities and an action plan of for 2017-2020.

The goal of the DRR Strategy is to create a unified, flexible and efficient system, which will ensure reduction of natural and man-made disaster risks by joint efforts and coordinated activities of the agencies defined in the Georgian legislation. To this end, the objective of this strategic document is to reduce natural and man-made disaster risks identified in the “National Threat Assessment Document 2015-2018” (floods, flash floods, landslides, mudflows, biological hazards, earthquakes, hailstorms, avalanches, strong winds, forest and valley fires, chemical threats, soil erosion by water, drought, hydrodynamic accidents etc.) and to mitigate the possible damage.

The National DRR Action Plan combines planned and ongoing projects, programmes and initiatives of different governmental agencies and non-government organizations. It also defines responsible and supporting institutions/organizations (if needed) for each activity, as well as deadlines and sources of finance for implementation.

The following strategic priorities are defined in the DRR Strategy:

- /// Reduction of Natural and Man-made Disaster Risks Identified in the “National Threat Assessment Document 2015-2018”;
- /// Establishment of a DRR System at National Level – i) improvement of DRR legislation, ii) DRR capacity building (e.g. individual capacity building, infrastructure improvement), and iii) development of reserves for Crisis Situations to Ensure Disaster Preparedness;
- /// Establishment of the DRR System at Local Level – i) threat assessment at local level, ii) planning the DRR Measures on Local Level, and iii) enhancement of DRR Capacity Building at Local Level;
- /// Development/Implementation of Methodology/Approach for Post-Disaster Damages and Recovery;
- /// Needs Assessment and Calculation of Economic Losses;
- /// Enhancement of Role of Media within the DRR System;
- /// Enhancement of Cooperation with Academic and Scientific Community within the DRR System;
- /// Implementation of DRR model into the Educational System;
- /// Development of Geospatial Data Infrastructure for DRR – development of geospatial data infrastructure in line with the EU INSPIRE directive;
- /// Gender Equality in the DRR Policy; and
- /// Increasing the Role of Persons with Disabilities within the DRR Policy.

The National Action Plan on Disaster Risk Reduction (DRR NAP) for 2017-2020 stemmed from the national DRR strategy, in the area of risk reduction of climate-induced natural hazards, includes actions which are already completed, being implemented and those which are planned during next four-year period. An indicative list of ongoing and planned actions is as follows: integration of radar meteorological data located at Tbilisi Airport into the weather forecasting system, procurement; installation and operationalization of the regional radar (to be installed in Kutaisi airport); improvement of assessment and monitoring of hydrometeorological and geological hazards; construction of river bank protection structures etc. Planned actions target the areas with highest risk of floods, flash floods, mudflows, landslides, avalanches, hailstorms and droughts, including: i) landslide-mudflow transformation and/or flashflood-prone river gorges in Kakheti (Duruji, Kisiskhevi, Telaviskhevi, Tsinandaliskhevi, Cheremiskhevi, Turdo, Gomborula, Chailuriskhevi, rivers), Samtskhe-Javakheti (Otskheli River), Mtskheta-Mtianeti (Gveltakhevi River), Racha-Leckhumi and Kvemo Svaneti region (Lajanuri, Khrikhula watersheds, upper Rioni watershed), Samegrelo-Zemo Svaneti (lower courses/ Rioni delta near Kvemo Chaladidi); ii) the Rioni River downstream of Kutaisi with high riverbed and

21 Source: <https://matsne.gov.ge/ka/document/download/2993918/0/ge/pdf>

bank erosion (Samtredia, Khobi, c. Poti, etc.); iii) extreme downstream portion of the Alazani river (meanders near the border); iv) several landslide bodies near Tbilisi and other areas; v) mountainous areas with a high risk of avalanches (Bakhmaro, Kazbegi, Upper Svaneti, etc.); vi) areas with high risk of hailstorms (Kakheti); and vii) areas with high risk of droughts (Kakheti, Shida Kartli, Kvemo Kartli).

The actions planned consist of both soft and hard measures, including improvement of risk knowledge, preparedness, resilience, implementation of preventive/protective structural measures, public awareness and education, planning and implementation²².

The most recent development in the area of DRR/EWS is the process of preparation of a National EWS concept paper under the coordination of the MIA, consisting of five components/outputs. The first component aims at elaboration of relevant legal-regulatory basis for the EWS (e.g. sub-laws on unified disaster response and early warning systems, the rule on collection, processing and storage of disaster-related information, a sub-law on measures related to the setting up and functioning of telecommunications systems and warning mechanisms, etc.). The second component aims at systematic data collection on hazards and risks from various sources (e.g. hydromet service, 112 services, local divisions of EMA etc.) and establishing common rules and means for communications. The third component serves to develop a system for regular data collection, processing, analysis and risk assessments, as well as creating effective information dissemination and communications channels. More specifically, the output includes development and application of various modelling softwares for hazard, vulnerability and risk assessments, development of a national and regional risk atlas, developing and strengthening an inter-agency emergency management centre (situation room), identification of information receivers, and information dissemination and communication means (e.g. TV/radio signals, stationary and mobile sirens, electronic signs, low frequency radio means/walkie-talkies, GSM (CBS) mobile operators, digital TV, mobile phones, internet, VOIP and satellite phones, short SMS etc.) and establishment of message filtering and re-addressing system for the 112 services. The fourth component aims to strengthen national and local response capacities through public awareness campaigns, development of disaster response plans and response capacity building of the population and private sector. The fifth component aims to develop human resources, including elaboration and introduction of education and training programmes at various levels of education and the implementation of such programmes. With the recent restructuring of MIA and State Security and Crisis Management Council (SSCMC), this concept should be reviewed and updated, taking into consideration the new institutional setting.

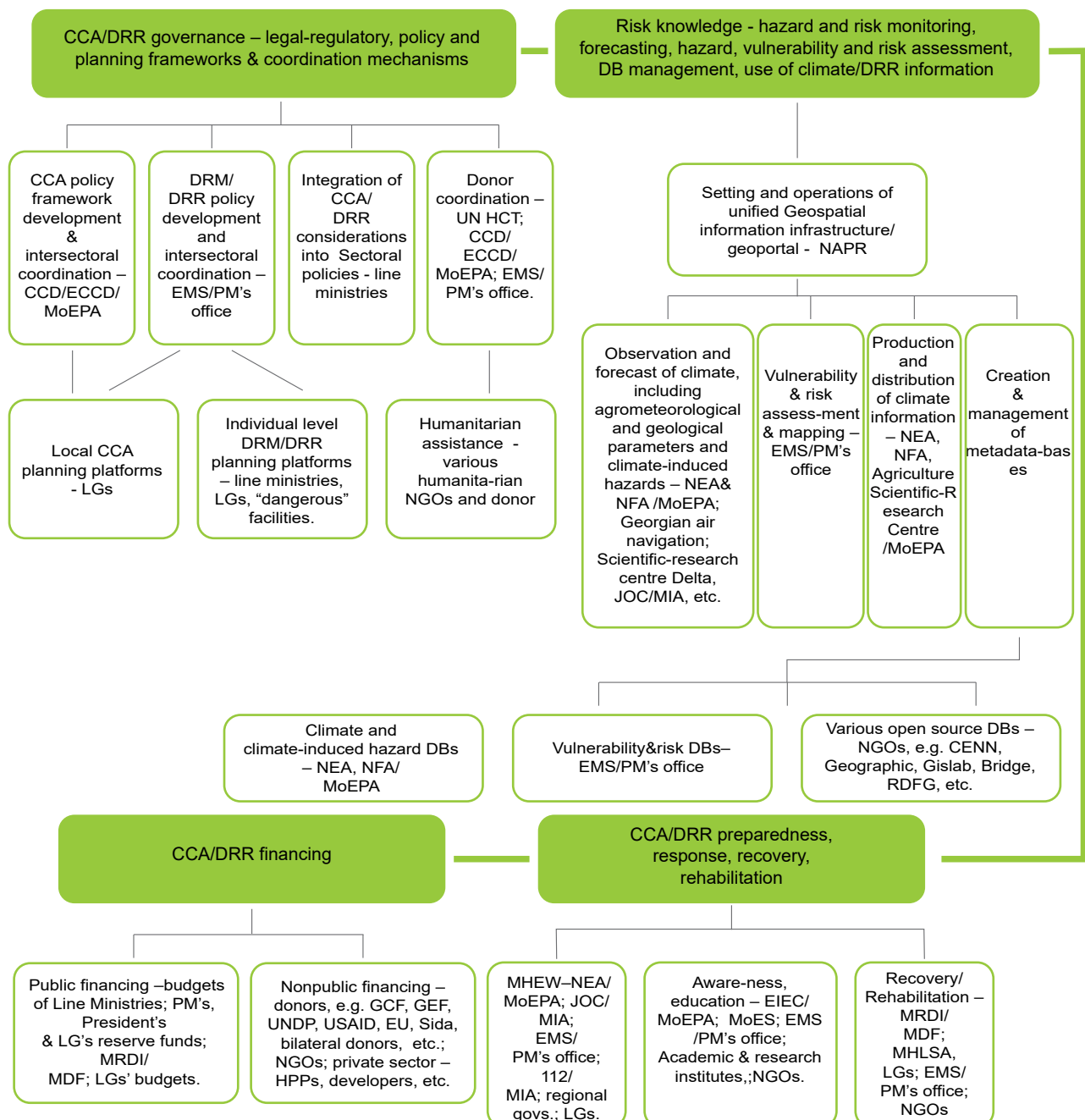
22 Source: National Action Plan for DRR, 2017-2020. https://www.preventionweb.net/files/54533_drrstrategy2017annex2eng.pdf

4.0

Institutional setting for CCA/DRR

4.1 Functional relations between various institutions engaged in CCA/DRR

The CCA/DRR institutional setting is quite complex in Georgia, involving Line Ministries such as the Ministry of Environmental Protection and Agriculture and its specialized agencies; the Ministry of Regional Development and Infrastructure, the Ministry of Internal Affairs and its 112 Service and Joint Operational Centre, the Emergency Management Service under the Prime Minister's office, other sectoral Ministries, regional governors' offices and local governments in developing and implementing CCA/DRR legal-regulatory, policy and planning frameworks and financing in the CCA/DRR area. Apart from this, various donors, donor-funded projects, NGOs and academic and research institutions are engaged in almost all aspects of CCA/DRR, including capacity building of various institutions, awareness raising and education, preparedness, response, recovery and rehabilitation. Below is a flowchart of functional interrelations of various institutions engaged in CCA/DRR.



4.2 Structures, roles and mandates of state institutions

4.2.1 Ministry of Environmental Protection and Agriculture

The Ministry of Environmental Protection and Agriculture (MoEPA), a recent merger of the previous two Environment and Agriculture Ministries, is responsible through its Department of Environment and Climate Change (DoECC) for developing and implementing national CCA policies and meeting the commitments taken under UNFCCC. The MoEPA through its first Deputy Minister is GCF National Designated Authority (NDA). The MoEPA through DoECC will play an executive role in the Project Board of the upcoming multi-component GCF project and coordinate its activities.

Other departments and subordinated bodies engaged indirectly in CCA/DRR, are as follows:

- /// Policy and Analysis Department – coordination of development and implementation of environment, agriculture and rural development policies and integration of CCA into these policies;
- /// Agriculture, Food and Rural Development Department – elaboration of agriculture, food safety and rural development priority directions, programmes and concrete projects that also include directions related to DRR and CCA in rural areas and promotion of diffusion of innovative modern agriculture, including climate-smart agriculture technologies and techniques/practices;
- /// Hydro-melioration (same as Irrigation-Drainage) and Land Management Department – development and monitoring of implementation of land reclamation, including irrigation/drainage policies, plans and programmes;
- /// Scientific Research Center of Agriculture, Legal Entity of Public Law (LEPL) – research and development of advisory products on integrated pest control, soil fertility, land reclamation etc.;
- /// Biodiversity and Forestry Department – elaboration of national forestry and protected areas policies and programmes and coordination/promotion of their implementation;
- /// National Forest Agency, LEPL – management of the state forest fund, including reforestation-afforestation activities, and forest protection activities (e.g. sanitary cuts, pest control); and
- /// Agency for Protected Areas, LEPL – management of the protected areas system in Georgia.

MoEPA's structural units and sub-ordinated bodies (Agencies) having a crucial role in CCA/DRR are discussed in detail below.

4.2.1.1 Department of Environment and Climate Change²³

Climate Change Division (CCD). Under the DoECC, the CCD has a primary responsibility for²⁴:

- /// harmonizing national legislation with requirements of UNFCCC;
 - /// coordinating implementation of UNFCCC commitments;
 - /// participating in activities of the UNFCCC secretariat, expert working groups and other international organizations;
 - /// coordinating development and implementation of National Adaptation Plan(s) for vulnerable economic sectors and ecosystems;
 - /// monitoring CCA projects, including GCF-funded projects across the country;
 - /// coordinating preparation of National Communications (NCs) for submission to the UNFCCC secretariat;
 - /// assessing current and future vulnerabilities of various sectors and ecosystems to climate change;
 - /// supporting diffusion of CCA technologies and practices; and
 - /// raising awareness of stakeholders and the general public on CCA-related issues.
- /// The Head of the CCD is the focal point to the UNFCCC, coordinating preparations of NCs to the UNFCCC.

²³ Source: i) Interviews with representatives of MoEPA; and ii) Charters of MoEPA.

²⁴ These functions are taken from the Charter of Integrated Management Department, a predecessor of DoECC, whose charter was not approved during this stakeholder analysis. However, based on the consultations with DoECC staff, it will maintain its functions regarding climate change.

Table 1 below contains summary information on CCA projects implemented under the coordination/ supervision of the Department of Environment and Climate Change (DoECC) of the MoEPA.

N	Title	Donor	Duration	Brief description
1	Support to the participation in GFC	GCF	2017-2018	<ul style="list-style-type: none"> Capacity building of NDA – establishment of coordination mechanism and technical working group/council Development of GCF project selection criteria and procedures Development of a strategy and national plan for participation in GCF Consultation with stakeholders on accreditation issues Support to the dialogue between NDA and GCF secretariat, accredited bodies and other parties
2	Preparation of Fourth National Communication (FNC) and Second Biennial Update Report (SBUR) to UNFCCC	UNDP/GEF	2017-2021	<ul style="list-style-type: none"> Development of FNC and its submission to UNFCCC Development of SBUR and its submission to UNFCCC
3	Capacity development of South-East, East Europe, South Caucasus and Central Asian Countries in implementing CC policies, 3rd phase	Commissioned by: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) GIZ	2017-2021	<ul style="list-style-type: none"> Study of EU CC and energy directives and 20/20/20 agenda Development of recommendations on Kyoto and post-Kyoto country actions Study of national CC mitigation and adaptation policies Support to development of low carbon development strategies
4	Clima-east: promotion of CC adaptation and mitigation (CCA&C-CM) in eastern countries and Russia	EC	2012-2017	<ul style="list-style-type: none"> Expansion and upgrade of hydrometeorological network Upgrade of meteorological database Upgrade of hydrometeorological database Knowledge transfer from Czech Hydrometeorology Institute
5	Development of National Adaptation Plan (NAP) for Agriculture Sector	IFAD/GEF	2016-2017	<ul style="list-style-type: none"> Development of NAP for agriculture sector
6	Institutionalization of CC adaptation and mitigation in regions of Georgia	USAID	2012-2016	<ul style="list-style-type: none"> Capacity building of local governments in CC adaptation and mitigation Development of CCA&CCM road map
7	Prevention project on Supsa, Kintrishi and Chorokhi watersheds	SDC	2014-2016	<ul style="list-style-type: none"> Improving quality of disaster risk management mechanisms through increased capacity at the MRDI and better coordination between MRDI, Ministry of Environment and Natural Resources Protection (MEP) and local authorities reducing risks from natural disasters as a result of preventive measures Developing engineering solutions for identified hotspots and implementing 5 measures (in village Jurukveti, Lanchkhuti; Kobuleti, river Dekhva; village Jocho, Khelvachauri; Keda; in village Boziauri, Khulo)
8	Development of local capacities and strengthening of regional cooperation for climate change adaptation and protection of biodiversity in Georgia and South Caucasus	EU	2011-2014	<ul style="list-style-type: none"> Development of local capacities and strengthening of regional cooperation for climate change adaptation and protection of biodiversity in Georgia and South Caucasus

Land Management Division (LMD). Concerning CCA, the LMD is engaged in coordinating, planning and implementing mitigation measures in regard to desertification and land degradation, with many of these measures being considered as CCA ones. In addition and in relation to CCA, the LMD has a primary responsibility for:

- /// participating in coordination of projects addressing desertification and land degradation;
- /// analyzing the current status of land affected by drought, erosion, improper irrigation drainage etc. and development of mitigation/control measures; and
- /// raising awareness of stakeholders and the public on desertification and land degradation.

4.2.1.2 Environmental Information and Education Center (EIEC)²⁵

The Environmental Information and Education Center (EIEC), a legal entity of public law under the MoEPA, is responsible for collection, storage of environmental information and its dissemination and (re-)training of MoEPA staff and staff of other state institutions in various environment-related topics, including CCA and DRR. The EIEC is also in charge of environmental education and general public awareness-raising. Under the First Biennial Update Report (FBUR) project, the EIEC as an institution was involved in implementing certain components of the BUR. The EIEC is also involved in developing the Second BUR and FNC project. In addition, the EIEC has developed and conducted training of school children in DRR. The EIEC will be a responsible party for large-scale education and outreach campaigns on DRR and the multi-hazard early warning system for 100 vulnerable communities, children, university students and general public under a recently approved UNDP/GCF/SDC project.

4.2.1.3 National Environment Agency (NEA)²⁶

Functions, structure and staffing. NEA's Hydrometeorological and Geological Departments are directly responsible for monitoring, forecasting and mapping meteorological and geological hazards. More specifically and according to one of the NEA's statutes, the Hydrometeorological Department performs the following functions concerning climate-induced hazard assessment and mapping:

- /// Identification of reasons and geographic distribution of climate-induced hydrometeorological hazards;
- /// Preparation of warnings on climate-induced natural hazards and dissemination to key decision-makers (including the municipalities), organizations and media according to a governmental list;
- /// Field hydrometeorological assessments/expeditions;
- /// Identification of physical parameters for snow cover in high-mountainous regions;
- /// Conducting glacier studies;
- /// Marine observations and studies of the coastal zone;
- /// Hydrometeorological observations in river basins of Georgia;
- /// Hydrometeorological data processing, storage and QA/QC;
- /// Making hydrometeorological forecasts;
- /// Statistical analysis of multi-year data, GIS mapping and creation and maintenance of databases;
- /// Preparation of climate yearbooks, hydrological cadastres, hydrometeorological bulletins and other information products; and

25 Source: i) Interviews with representatives of MoEPA; ii) Charters of MoEPA and EIEC; and iii) Source: Feasibility study. Annex II, GCF project: Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia.

26 Source: i) Interviews with representatives of NEA; ii) Charters of MoEPA and NEA; iii) Source: Feasibility study. Annex II, GCF project: Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia; and IV) NEA information and data.

Hydrometeorological hazard mapping and risk assessment.

Table 1 below provides information on structural sub-units and number of staff employed under these units.

#	Structural unit	Number of staff employed
1. Division for Hydrometeorological Forecasting		
1.1	Head of the division	1
1.2	Short-term weather forecasting unit	12
1.3	Long-term weather forecasting unit	4
1.4	Hydrological Forecasting unit	3
1.5	Hydrometeorological modeling unit	4
Sub-total		24
2. Division for Mitigation of Hydrometeorological Risks		
2.1	Head of the division	1
2.2	Coastal zone monitoring and hazard prevention unit	8
2.3	Hydrometeorological hazard early warning unit	7
Sub-total		16
3. Division for Meteorology and Climatology		
3.1	Head of the division	1
3.2	Meteorology unit	8
3.3	Basic and applied climatology unit	4
3.4	Agrometeorology and agrometeorological modeling unit	3
Sub-total		16
4. Telecommunications Division		
4.1	Head of the division	1
4.2	Staff	12
Sub-total		13
5. Database Management Division		
5.1	Head of the division	1
5.2	Staff	9
Sub-total		10
6. Measuring Equipments Technical Maintenance and Metrology Division		
6.1	Head of the division	1
6.2	Staff	5
Sub-total		6
7. Field Expeditions Division		
7.1	Head of the division	1
7.1	Staff	4
Sub-total		5
8. Inland Hydrology Division		
8.1	Head of the division	1
8.2	Staff	5
Sub-total		6
9. AAR Hydrometeorological Observatory		
9.1	Head	1
9.2	Staff of meteorological, hydrological and agrometeorological stations and posts	8
Sub-total		9

10. Kolkheti Hydrometeorological Observatory		
10.1	Management, including head and professional staff	3
10.2	Staff of meteorological, hydrological and agrometeorological stations and posts	21
Sub-total		24
11. Samtskhe-Javakheti Hydrometeorological Observatory		
11.1	Head	1
11.2	Staff of meteorological, hydrological and agrometeorological stations and posts	7
Sub-total		8
11. Kartli and Kakheti Hydrometeorological Observatory		
12.1	Head	1
12.2	Staff of meteorological, hydrological and agrometeorological stations and posts	24
Sub-total		25
Total		138

Table 1. Structural division and number of staff of the Department of Hydrometeorology (NEA, 2018)

The functions of Geology Department are as follows:

- // Management of geological hazards;
- // Regular (spring and fall) geological monitoring in settlements of Georgia;
- // Response to geo-ecological risks;
- // Under force majeure situations, risk and potential impact assessment in geological hazard prone areas;
- // Preparation of visual geological reports with recommendations for protection measures;
- // Geological hazard mapping and monitoring within the boundaries of Tbilisi;
- // Development and publication of an annual geological bulletin;
- // Development/update of geological hazard maps, GIS and geological cadastres accross the country;
- // Geological surveys and preparation of state geological maps of various scales;
- // Response to the notifications/warnings received from “Hotline”; and
- // Fresh groundwater monitoring.

Table 2 below contains information on the structural division and number of staff for the Geology Department.

N	Structural unit	Number of staff employed
1. Administration/management		
1.1	Head of the department	1
1.2	Deputy head of the department	1
Sub-total		2
2. Division for Geological Surveys		
2.1	Head of the division	1
2.2	Professional Staff	5
Sub-total		6

3. Division for Disaster Processes, Engineering-Geology and Geoecology		
3.1	Head of the division	1
3.2	Disaster Processes and Engineering-Geology group	14 (nine permanent staff and five consultants)
3.3	Geoecological complication response group	9
Sub-total		24
Total		32 (27 permanent staff and five temporarily contracted employees)

Table 2. Structural division and number of staff of the Geology Department (NEA, 2018)

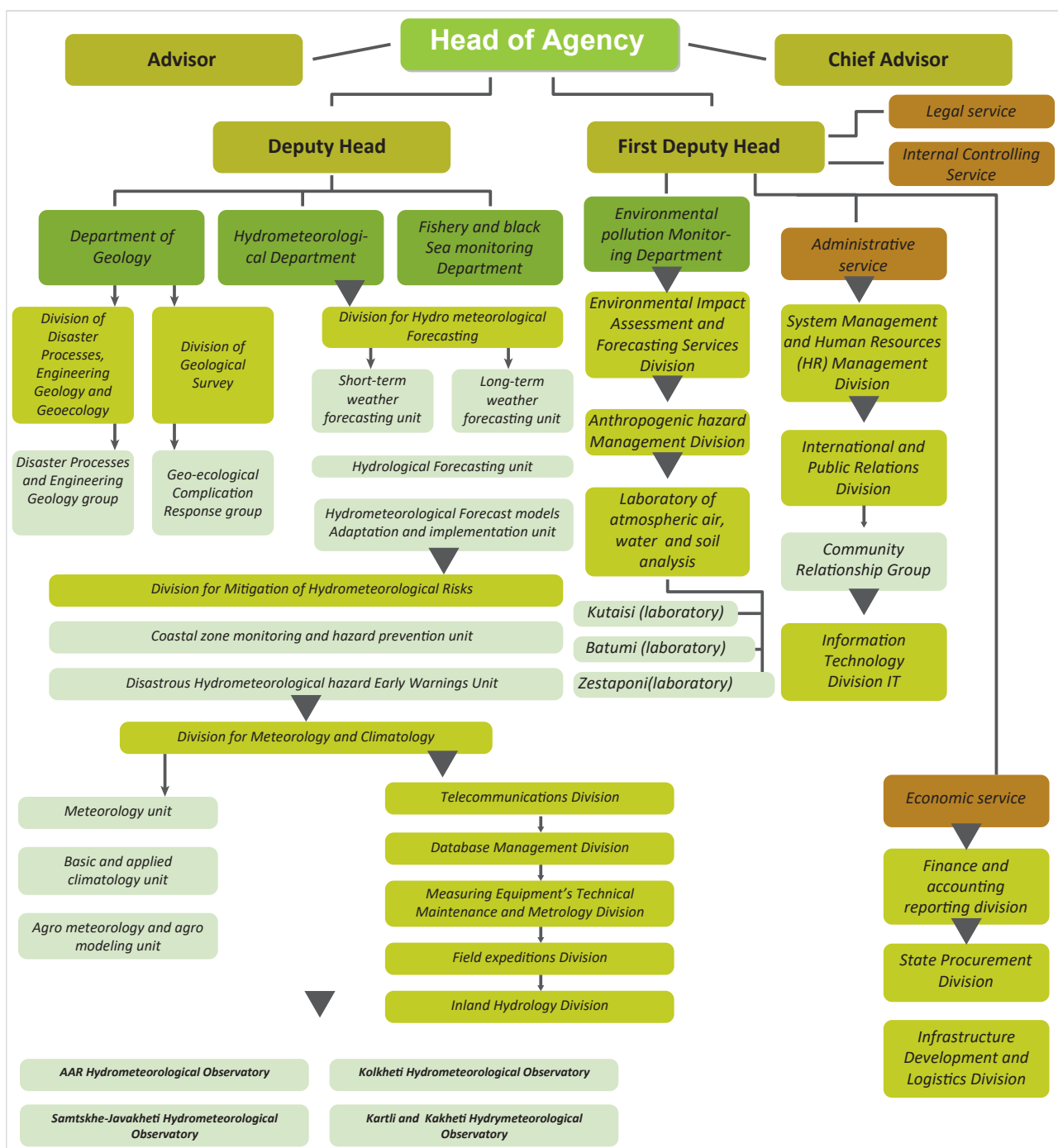


Figure 5. 2018 organogram, NEA 2018

infrastructure. Georgia has a long history of hydrometeorological monitoring activities. In the 1980s, the hydrometeorological service of Georgia possessed a large network of hydrometeorological stations in Georgia. In that period, the meteorological observing network covered almost all residential areas and places with different microclimate conditions, including hilly and mountainous regions, while the hydrological observations covered almost all large and medium-sized rivers. In addition, radar, aerological, actinometric, ozonometric, agrometeorological and other types of specialized observations were conducted.

After Georgia became independent, the hydrometeorological service funding was drastically reduced, which led to the significant decline of the observation network. At first, the number of standard hydro-meteorological parameters' observation was reduced three to five times, and then the above-listed specialized observations completely stopped. Since 2000, a number of projects aimed at strengthening the hydro-meteorological service have been implemented and are still carried out by the World Meteorological Organization (WMO), other international organizations and donor countries. Within the framework of these projects, dozens of meteorological and hydrological stations have been purchased and installed. The evolution of the number of hydrometeorological monitoring stations over time is shown in Figure 6 below.

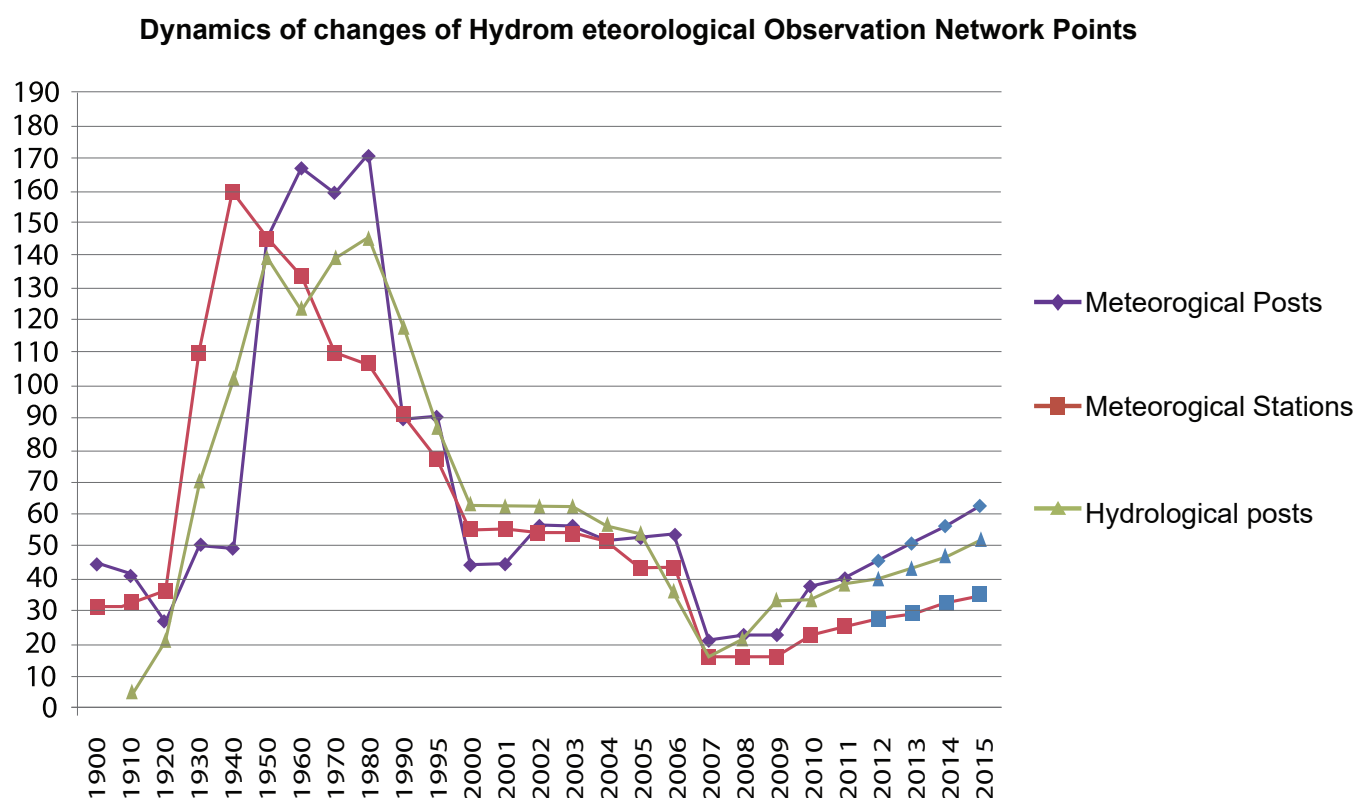


Figure 6. Dynamics of hydrometeorological network of Georgia (Feasibility study, UNDP/GCF project)

At present, hydrometeorological monitoring by the NEA is carried out at around 29 weather stations, including 24 automated weather stations; 58 meteorological posts, including 34 automated posts, 14 rain gauges (including six automated gauges); and 74 automated hydrological stations. The NEA has 10 automated agrometeorological stations. Meteorological stations measure atmospheric temperature, humidity, pressure, precipitation, wind direction and speed; meteorological posts measure temperature, humidity and precipitation; and hydrological stations measure water level, water discharge and precipitation.

Station type	Station N	Status
MWS (Manual weather/meteorological station)		
MS	29	Operational
MP	58	Operational
Rain gauge	14	Operational
AWS (Automated weather/meteorological station)		
AWS/MS	24	Operational
AWS/MP	34	Operational
AWS/rain	6	Operational
AWS/agro	10	Operational
AHS (automated hydrological station)		
AHS	74	Operational

Table 3 below gives a summary of the type, number and status of the stations, and Figure 7 below shows the geographic distribution of the network.

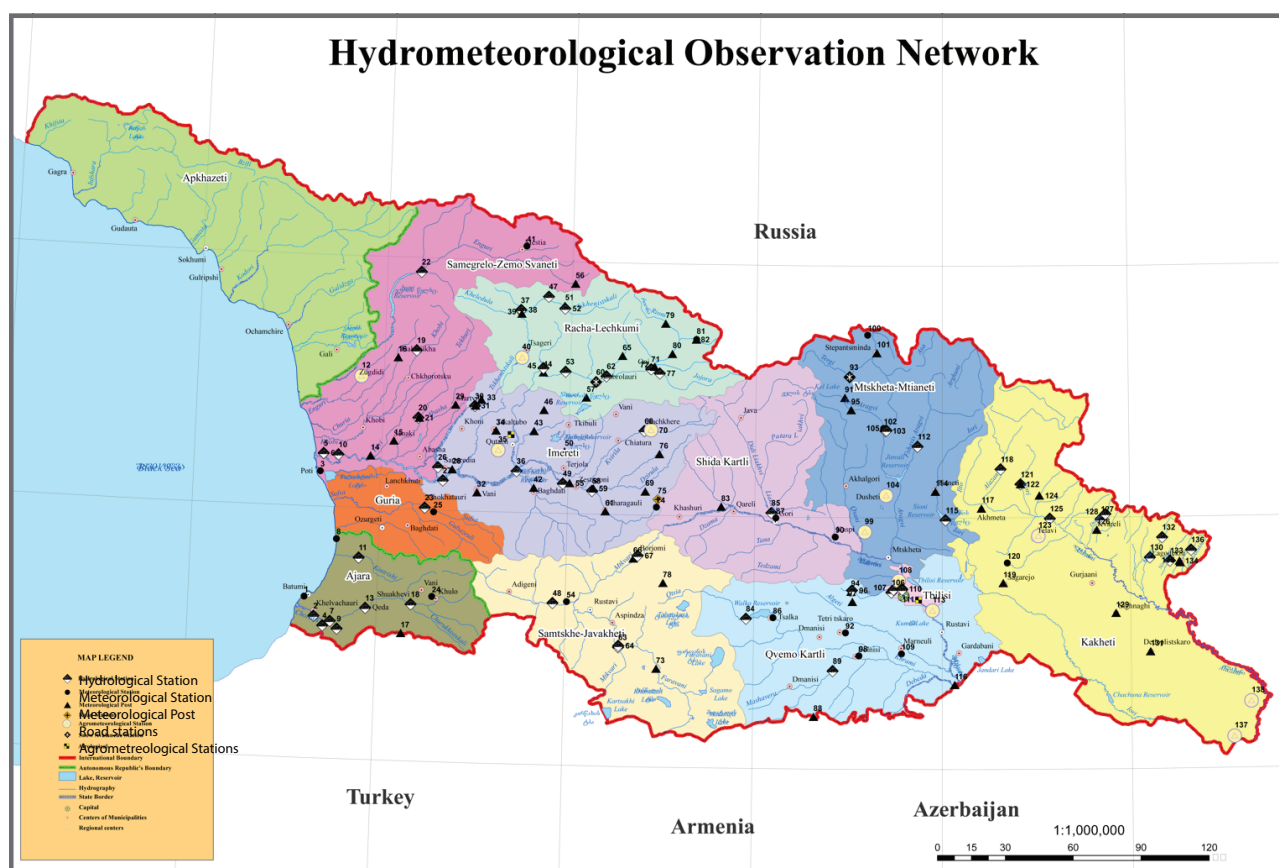


Figure 7. Geographical distribution of the hydrometeorological network operated by the NEA (NEA, 2018)

In Eastern Georgia, one radar system is installed in Kakheti and maintained by the Centre for Controlling Natural Hazards (CCNH). The NEA has purchased the license and has direct access to the data and operation of this radar. Another radar is installed at Tbilisi International Airport and is owned and operated by the National Aviation Service. The NEA holds the license for operating this radar as well and has direct access to the data and operation of this radar. In Western Georgia, the NEA has access to two Turkish radars. One radar will soon be installed at Kutaisi International Airport with the

financial assistance of the U.S. government, and will also be operated by the NEA. A fourth radar is foreseen to be installed in Poti by the National Aviation Service. The NEA will have the access to these radar data as well. Last year, NEA was instrumental to have access to Tbilisi Radar data. The Hydrometeorology Department has also two drones. The pilot two sets of lightning monitoring elements are already functioning in Georgia and six more are needed. The radar data and the lightning monitoring data would be integrated into one system, and would facilitate effective functioning of the DRR system.

Twice per year, the Department of Geology conducts the monitoring of geologically-hazardous processes including landslides, rockfalls and mudflows throughout Georgia (except for Tbilisi municipality since 2000). A significant reduction of staff and equipment has taken place over the years. There is a huge data archive available (geological maps), but the majority of the maps are in paper format. The lack of adequate equipment, human resources and finances are obstacles to the provision of reliable and timely warnings. The assessment of the geological hazards is made based on the visual monitoring of the sites and based on the inventory performed in the 1970s and 1980s (geological maps). It should be noted that, in August 2015, the NEA initiated a project to digitize the geological information kept in archives in paper format. The project is being carried out by the Georgian National Archive within a three-year period, financed by the GoG. Under the Rioni Adaptation Fund (AF) project, several inclinometers were purchased and installed at a few points of Ambrolauri, Tsageri and Tskaltubo municipalities. Modern monitoring equipment is installed in Dusheti municipality (three locations) within a project financed by the CzDA, and instrumental monitoring is conducted in Tbilisi (three landslide areas). Moreover, a landslide EWS is being implemented for the Devdoraki gorge.

In general, the Geological Department conducts regular instrumental monitoring of landslide displacement at seven points across the country where landslide deformation, displacement and groundwater movement are measured by inclinometers, piezometers and rappers (GPS points). At two hydrological gauges, water level is measured, and other parameters at one meteorological station, which are also used for landslide monitoring and prediction. The Department also has one drone.

The NEA also conducts surveys of snow cover during February-March of each year through field expeditions, and studies conditions at around 20 known avalanche locations.

Monitoring of groundwater could be a good indicator on climate change impacts on groundwater reserves and ultimately on the water resources of Georgia. To this purpose, the Department of Geology has 51 sampling locations with 45 monitoring wells (of which two-three wells are out of order) and six springs. Monitoring data on water quantity and quality from wells are received automatically by the central server of the NEA.

Georgia's glaciers are the country's important climatic-economic resource, as they hold a significant amount of freshwater and make a major contribution to the country's water regime and regional climatic conditions. The glaciers often contribute to glacial and hydrological disasters that seriously affect the internal and trans-boundary roads of Georgia, and also have impacts on transportation safety and the life, health and socio-economic conditions of the population, including the emergence of eco-migrants. The Hydrometeorological Department of the NEA conducts a systematic annual monitoring of Georgian glaciers. The Kazbegi region, which includes the Devdoraski Glacier, has a glacial disasters early warning system installed.

Thus, in terms of hydrometeorological and geological monitoring, it can be concluded that Georgia has a long history and extensive technical know-how. However, limited financial and human resources coupled with a severely reduced monitoring network constrains the NEA's ability to monitor important variables and parameters at appropriate spatial and temporal scales; to provide adequate input to effective long-term management of hazards; and to support an effective national multi-hazard EWS. This is a key barrier that will need to be addressed in order to implement an effective multi-hazard EWS.

Concerning weather and hydrological forecasts and early warning, the NEA is responsible for preparing and distributing short (three-day advance) and medium-term (10 days beforehand) weather

and hydrological forecasts on a daily basis. For the preparation of the short- and medium-term weather forecasts, the USA's and German models are commonly used.

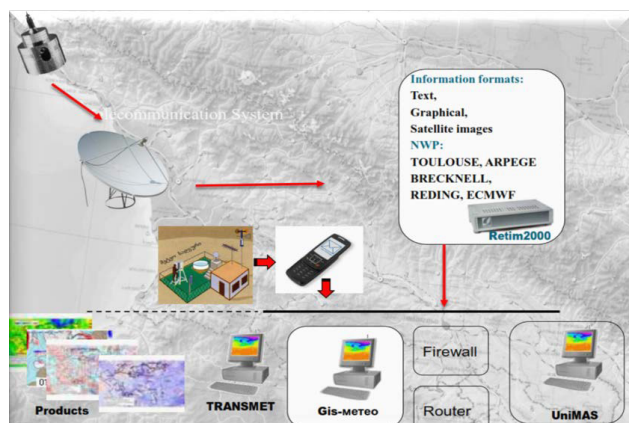


Figure 8. Telecommunications system of the NEA²⁷

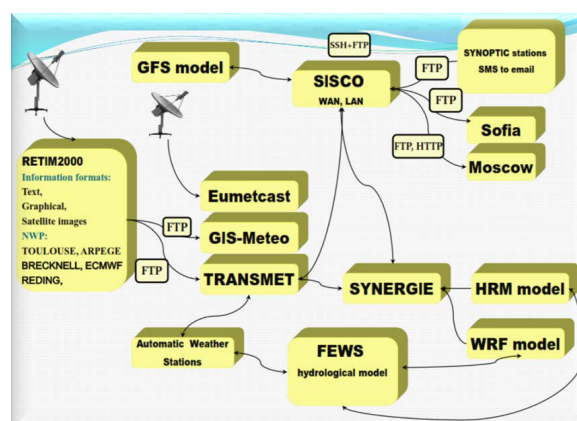


Figure 9. Hydrometeorological data circulation of the NEA²⁸

Due to the lack of high-resolution models as well as radar and areological observation data, the spatial and temporal resolution of forecasts are low. The short-term forecasts are 24- and 48-hours beforehand and without indication of possible locations. This makes it difficult, in some cases impossible, for decision-makers to use these forecasts to avoid or mitigate the effects associated with disasters. For example, on 12 June 2015, the day before the floods that affected Tbilisi, the NEA distributed a warning on the potential disaster risk of heavy rainfall, floods/flash floods and mudflow processes in Georgia, which did not include information on either the exact locations or expected time of the hazard occurrence.

Concerning floods and flash floods, in the past the NEA did not use numerical hydrological and hydraulic models. Only forecasting of spring floods based on snowmelt and temperature regime was done. More recently, under the Rioni AF project, a hydrological model was developed and calibrated based on historic data. For this, the HEC-HMS computer model was applied for the rainfall-run-off component of the risk assessments and flood forecasts. For hydrodynamic modeling, the MIKE FLOOD (1D+2D) model was applied, which is tailor-made for hydraulic modeling of surface water bodies modified by hydrotechnical structures, for the risk assessment of flood water levels and flows. When integrated into the forecasting platform (Delft-FEWS) only the 1D element of the FLOOD model MIKE 11 was used. The Rioni FEWS provides forecasts of flooding in the Rioni basin with up to 72 hours advance warning, and expected water level at key locations within the basin. In addition, the Rioni flood hazard maps provide the expected extent of floods of various return periods, which can be used in combination with the forecasted flood levels to identify areas at risk from impending floods. This represents a step-change in NEA's capability to forecast flooding in Rioni.

The NEA cooperates and exchanges information with the Georgian Civil Aviation Agency (GCAA) responsible for aviation meteorology, and the Georgian State Hydrographic Service (GSHS). One of the objectives of the GSHS is marine navigation equipment monitoring and modernizing in line with international hydrographic services and IHO and IALA standards, as well as according to the UN Convention SOLAS requirements. Its network consists of 48 ground-based and 34 sea units.

The NEA's Department of Geology provides an annual geo-hazards bulletin that is sent to municipalities, EMA, the MRDI, and other interested parties, along with an outlook for the year to come. Since 2000, the NEA had not conducted longer-term forecasts of geological hazards. Before, it was providing a 20-year prognosis.

In terms of data management, the NEA uses WinZPV software, which hosts and stores hydrological data. Meteorological data are entered and stored in CLIDATA. For archiving purposes, the Oracle programme is used. It should be noted that there is no adequate information system for storing modelling results and satellite images and data; these can be stored only for up to one year.

27 Source: Feasibility study. Annex II. Funding Proposal to GCF.

28 Source: Feasibility study. Annex II. Funding Proposal to GCF.

Under UNDP Rioni AF (Adaptation Fund) project, the Delft-FEWS was established, which is a platform for integrating all sources of meteorological forecast data with observed data from automatic weather and hydrological stations, and managing the process of running hydrological and hydraulic models to produce water level forecasts at key locations. It is based on a GIS system and may generate alert and warning messages. Under the same project, two archives for meteorological and hydrological data have been merged and stored in the CLIDATA system.

Apart from the above, the NEA participates in the regional system of the Middle East and Black Sea Region countries for flash flood forecasting (BSME-FFG). This is the WMO/USAID-developed global forecasting system applied for rough forecasts of flash floods in smaller watersheds. Turkey represents a regional hub for participating countries. The system including a supercomputer is operated by the national meteorological service. Georgia cannot use this tool presently since it does not have a sufficient number of rain gauges and weather radar data. Apart from this, the resolution of the model is not adequate for describing the country's topography. Therefore, for Georgia the model is verified annually based on seasonal forecasts.

In addition, an early warning system was developed in the mountainous area (Devdorak-Amal gorge) in the northern part of Georgia. The area suffered from two major landslides/debris flows in 2014 (17 May and 20 August): the Dariali landslide/debris flow and a landslide from Mount Kazbeg (Mkinvartsveri), which claimed the lives of ten people and caused damage to a transit gas pipeline for natural gas from Russia to Armenia through Georgia. The early warning system that is being developed by Swiss experts (GEOTEST) is based on monitoring devices and will provide advanced warning to local communities. It will allow the NEA to respond to such natural processes a few minutes in advance, not only giving time for people to evacuate the danger area, but also ensuring safe travel along Georgia's Military Road, a major route through the Caucasus from Georgia to Russia.

A meteorological station and water level measures were installed in the Vere River basin, following the Tbilisi disaster of 13-14 June 2015, which caused 23 victims and destroyed extensive infrastructure.

It can be concluded that in terms of forecasting, the NEA has good experience of producing meteorological forecasts based on limited area models (LAMs) and forecasts, combined with sparse locally-monitored data to produce hydrological forecasts of impending hazards. On a more strategic and seasonal basis, forecasting is well-established as is evidenced by the daily and monthly bulletins that are produced. However, only recently, with the development of the Rioni flood forecasting system under the UNDP/AF project was the NEA provided with the capacity to undertake fully-integrated flood forecasting and early warning by integrating all meteorological data from international and local sources, with automatically monitored data within a flood forecasting model which predicted water level at key locations. This system and the capacity building that it included represented a step-change in the NEA's capacity in flood forecasting and early warning. Key barriers to comprehensive forecasting and early warning are the lack of forecasting models for all basins, lack of adequate real-time automated observations (due to the inadequate hydrometric network) and lack of human and financial resources to implement and maintain a national system for all appropriate hydrometeorological hazards. In addition, while there have been great strides made in the institutional arrangements around issuing warnings, there is still a lack of clarity with respect to specific roles and responsibilities in this regard, as discussed below.

In case of necessity, the NEA prepares and delivers timely warnings of impending natural hydrometeorological events to decision-makers (heavy precipitation, floods, hailstorms, snow avalanches, strong winds, droughts). The spring flood and long-term weather forecasts (monthly and seasonal) are also regularly produced and delivered to the interested customers. More specifically, for floods, the NEA is responsible for the first stages of the dissemination of flood warnings. It publishes a water level bulletin on a daily basis, including detailed information from all of the operating stations. This bulletin is sent to the President's Administration, the State Security and Crisis Management Council (SSCMC) currently transformed into the EMS, Ministries (including the EMA of the Ministry of Interior), operators of hydropower plants and other users upon request. In case of extreme events, this information is also sent to regional authorities. Information is also available through the NEA's website, where all the information from the different automated weather stations, hydrological stations and meteorological forecast information can be accessed by any interested user.

Activities implemented/being implemented by the NEA in 2017-2018 are as follows:

- // Routine hydrometric observations across the country
- // Codification of daily data in accordance with WMO standards, entry into a database, processing and dissemination
- // Continuous receipt and dissemination of global weather products, e.g. maps, diagrammes, images from global weather centres (Toulouse, France and Reading, England)
- // Hydrometric and snow cover surveys/field expeditions
- // Preparation of and provision to media and decision-makers of early warnings on hydrometeorological disasters. In total, 76 warnings were issued based on the contract with the U.S. EEC company, accessing Tbilisi meteorological radar.
- // Snow cover surveys on 16 routes, and based on this preparation of spring flood forecasts and its dissemination among end-users/consumers
- // Water discharge measurement at 302 observation points and, based on request of consumers, measurement of water discharge at 104 observation points
- // Preparation of hydrometeorological forecasts and warnings along the Georgian Military road and dissemination to consumers/end-users
- // Statistical processing of data and its QA/CC
- // Reprogramming of datalogger on six hydrological posts and integration of RTMC pro soft (Real-Time Monitor and Control Software, Professional Version 0i
- // Restoration of operations of three road AWS with assistance of Czech experts
- // Rehabilitation of eight automated hydrological posts
- // Financial assistance of U.S. government for installation of thunder/lightning detectors in Kutaisi and Tbilisi
- // Installation of five AHS, purchased under USAID G4G project in the Aragvi River basin
- // Avalanche hazard assessment in Khulo and Shuakhevi municipalities
- // With assistance of Polish Aid, the purchase and installation of two AWSs in Dusheti municipality
- // Development of avalanche risk reduction measures for Mleta-Gudauri and Kobi-Larsi sections of the Military Road of Georgia
- // Purchase and installation of five AWSs in Tetnuldi, Gudauri, Bakuriani, Goderdzi Pass and Bolnisi
- // Purchase and installation of one automated hydrological post in Khaishi
- // Initiation of design and installation of online video surveillance system for snow cover observations
- // Development of visual geological experts' reports on geodynamic processes and risk of geological disasters for 1,353 households of 545 settlements
- // Assessment of geological hazards for 1,042 settlements and issuance of annual bulletin
- // Field studies for Tbilisi hazard mapping
- // Development of 55 geo-engineering reports on the state of public infrastructure
- // Development of a geological map for Khashuri section (1:200 000)
- // Geological survey and desk work for developing a geological map for Kazbegi section
- // Instrument monitoring of landslides at three points of Tbilisi

Table 4 below contains summary information of the NEA's projects concerning hydrometeorological and geological monitoring, forecasts and early warning²⁹.

N	Title	Donor	Duration	Objectives	Activities/results
1	Capacity building and preparedness of Georgian institutions; 2nd phase	Polish government	June-December, 2016	NEA's capacity building in hydraulic modeling	Improvement of data quality of existing database; Training of NEA's staff in LIDAR scan data processing Training of NEA's staff in 2D hydraulic modeling Awareness-raising of stakeholders on flood risks with a focus on Jinvali-Mtskheta section Expansion of meteorological stations
2.	Landslide hazard assessment in Dusheti municipality based on the example of settlements, international roads and energy transmission lines	Czech government – Czech Development Agency (CzDa)	2015-2017	Improvement of geological EWS in Dusheti municipality; Capacity development of the NEA in landslide monitoring and assessment	Geological hazard assessment and mapping; EWS setting in highly sensitive areas
3	Improving Security of Transport Corridor through Developing Meteorological Monitoring and Forecasting	CzDa	2016-2017	Reduction of meteorological risks in TRACECA and military roads of Georgia	Installation of three road AWS Training of technical staff in O/M of installed AWS
4.	Improvement of Georgia's preparedness for weather extremes	CzDA	2011-2015	Risk reduction of hydrometeorological hazards	Expansion and upgrade of hydrometeorological network Upgrade of meteorological database Upgrade of hydrometeorological database Knowledge transfer from Czech Hydrometeorology Institute
5.	Georgian waters – capacity building for water resources monitoring and management in Georgia	Finnish Foreign Ministry	2011-2013	Capacity development of NEA in surface water monitoring in line with international standards, e.g. UNECE	Transboundary monitoring of Jandara Lake Flood risk management capacity building Capacity building of NEA in water quality and quantity monitoring
6	Support to the implementation of the EU Flood Directive in Georgia	Slovak Aid	2011-2013	Capacity building for implementation of the EU Flood Directive and flood risk management	Recommendations for the amendment of national legislation to be harmonized with the EU Flood Directive Development of an EU Flood Directive implementation mechanism Development of a national methodology for flood hazard mapping Expansion of hydrological monitoring in Alazani pilot area

²⁹ Hazard mapping-related projects are listed in the second stakeholder analysis report concerning hazard mapping.

7	Climate Resilient Flood and Flash Flood Management	UNDP/Adaptation Fund	2012-2017	Development of policies to promote resilience to flood and flash flood risks; Introduction of the flood managements practices to the local communities; Establishment of an early warning system to improve preparedness and adaptation of the local population.	<p>A topographic survey of the Rioni channels.</p> <p>A series of research and desk studies to provide complete and credible information on the hydrometeorological threats in the Rioni Basin - analysis of all existing data sets related to the Rioni Basin, scoping exercise to identify high risk areas in three municipalities, GIS analysis of the Rioni Basin to support hydrological and hydraulic modelling, and geomorphological and geotechnical studies.</p> <p>Digitization of historic information on the Rioni Basin, including data on floods, flash floods, mudflows, landslides and other natural hazards.</p> <p>Assistance to the Government of Georgia in revising the legislation on land use and building codes and standards.</p> <p>Floodplain zoning policy framework for Rioni river basin.</p> <p>Flood risk socio-economic model for 18 municipalities in Rioni river basin.</p> <p>Ten flood defense structures at high flood risk sites in six pilot municipalities.</p> <p>Modern flood forecasting and early warning system in Rioni river basin, including five meteorological stations, 20 meteorological posts and 10 hydrological posts</p> <p>Geological Hazards (landslide, Debris/mudflow etc) zoning map</p>
8	Programme on Natural and Anthropogenic Disaster Prevention, Preparedness and Response for ENPI (European Neighbourhood and Partnership Instrument) Eastern Partnership Countries	EU - Europe-Aid	2013-2014	Capacity building of the region's countries in disaster prevention, preparedness and response; cooperation with the EU Civic Protection Mechanism and enhancement of regional cooperation	<p>Transfer knowledge on hazards and risks, EU Flood Directive and SEVESO</p> <p>Preparation of a regional hazard atlas</p> <p>Development of a guidebook/manual on Civic Protection</p> <p>Elaboration of legal-regulatory and institutional recommendations on civic protection</p>
9	Assessment of hydropower resources of Georgia	Norway/Ministry of Foreign Affairs	2013-2016	Creation of electronic database on hydropower potential of Georgian rivers	<p>Creation of electronic database on Georgian rivers within NEA</p> <p>Capacity building of NEA in calculating river run-off</p>
10	Flood early warning and prevention on the example of Kabal and Duruj Rivers in Georgia	Polish Aid/PCPM	2014-2015	<p>Setting up of FEWS on Kabal and Duruj rivers; development of contingency plans for Kvareli and Lagodekhi municipalities</p> <p>Capacity building of local staff of Lagodekhi and Kvareli municipalities</p>	<p>Expansion and upgrade of AHS network in Kabal and Duruj river basins and on Alazin river (three stations)</p> <p>Hydrological modeling for the Kabal and Duruj rivers and 12 of their tributaries</p> <p>Setting up of EWS for Kabal and Duruj rivers</p>

11	Feasibility study for the modernization of hydrometeorological system	CzDA	2015	Feasibility study for hydromet system in Georgia, including capacity development needs	Recommendations on feasible hydromet monitoring system Capacity needs assessment
12	Enhancement of meteorological safety of TRACECA	CzDA	2015	Establishment of early warning system for drivers near Rikoti pass section of the road	Installation of one road AWS Training of NEA's staff in AWS O/M and development of short-term meteorological forecasts
13	Feasibility study and technical expertise of integration of a radar into NEA's meteorological networks	Swiss Development Cooperation (SDC)	2015	Feasibility study and recommendations	Feasibility study and recommendations
14	Capacity building of NEA for agrometeorological monitoring	FAO	2015	Feasibility study for the expansion of agrometeorological network	Feasibility study and recommendations on the development of agrometeorological network
15	Capacity building of NEA in monitoring and forecasting floods	Polish Ministry of Foreign Affairs – Polish Aid for Development	2015	Enhanced capacities of NEA in monitoring and forecasting floods	Installation of hydrometeorological monitoring equipment and EWS within small river basins of Tbilisi
16	Capacity building for DRR - Improvement of Tbilisi disaster risk management	UNDP	2015-2016	Enhanced capacities for multi-hazard disaster risk reduction	Assessment of geological and hydrological hazards for Tbilisi – Gldani river basin Hydrological hazard mapping based on hydrological and hydraulic modelling - Vere and Gldani rivers Geological Hazard zoning map and report
17	Training in hydraulic modeling – 2nd phase – Capacity Building and Preparedness of Georgian Institutions – 1st module	Polish Aid/ PMCG	2016	Enhance capacity of NEA's staff in hydraulic modeling	Validation of 1D hydraulic model for Aragvi River and rivers of Alazani and Iori river basins Training in MIKE and 2D modeling – Aragvi river basin Approximation of local modeling requirements to those of EU Flood Directive Training in LIDAR data processing Equipping NEA with IT technologies Improvement of meteorological database of NEA and establishment of NEA's library
18	Adaptation of Remote Sensing (RS) methods to water resources management and assessment of hydrometeorological hazards	Slovak Aid	2017-2019	Improved use of RS data for water resources management and assessment of hydrometeorological hazards	Capacity building of NEA in RS
19	Institutional Cooperation between the Ministries of Environment and Energy and Norway Water and Energy Directorate	NVE	2017-2023	Improved assessment and optimum utilization of Georgia's hydropower potential	Development of a comprehensive electronic hydrometric database Assessment of hydropower potential and its costing Assessment of impacts of various climate change scenarios on hydropower potential

20	Non-project assistance of Japan through provision of goods produced by Japanese SMEs	Government of Japan	2014-2017	Capacity building of NEA in hydrometeorological monitoring, forecast and ambient environment monitoring	<p>Purchase and installation of three automated air quality monitoring stations for Tbilisi as well as laboratory and field equipment</p> <p>Purchase and installation of two AWS for Batumi and Poti ports</p> <p>Purchase and procurement of four water level AWS for Khobistskali, Natanebi, Gubazeuli and Bjuja rivers</p> <p>Procurement and setting of data collection and management system for NEA's central office</p>
21	Monitoring and assessment of drought impacts on water resources and their effective application in Georgia	Slovak Aid	2017-2018	Improvement of knowledge base on negative impacts of droughts on water resources for better protection and sustainable utilization of these resources	<p>Development of drought monitoring and assessment system in areas highly susceptible to droughts</p> <p>Capacity needs assessment for drought hazard assessment, risk management and development of recommendations/project proposals for drought AWS</p>
22	Prevention and Preparedness project	Swiss Agency for Development and Cooperation (SDC)	2013-2016	Development of the initial multi-hazard mapping methodology including cost-benefit analysis tools for the prioritization of preventive actions.	<p>Provision of a series of Integrated Risk Management and hazard mapping courses to the specialists of NEA, MRDI, and EMS</p> <p>Support in the establishment of the multi-hazard mapping methodology</p> <p>Adaptation of DRR cost-benefit analysis tools</p> <p>Creation of multi-hazard (flood, snow avalanche, mudflow, landslide, rockfall) maps at scales of 1:5000 and 1:10000 for six communities of Mestia municipality</p> <p>Planning and construction of flood /mudflow prevention measures at high flood risk sites in Mestia municipality</p>
23	Development of an information system for data transfer and monitoring of groundwater in the region Alazani-Agrichai	Czech Republic Development Agency (CzDA); Geotest	2015	Development of state groundwater monitoring network in Georgia	Purchase and installation of groundwater monitoring equipment
24	Pilot project for introduction of an information system for data transfer and groundwater monitoring network in Kvareli and Lagodekhi municipalities	Czech Republic Development Agency (CzDA); Geotest	2014	Development of state groundwater monitoring network in Georgia	Purchase and installation of groundwater monitoring equipment
25	Pilot project for re-activation of groundwater level and quality monitoring network Alazani-Agrichai aquifer	Czech Republic Development Agency (CzDA); Aquatest	2013	Development of state groundwater monitoring network in Georgia	Purchase and installation of groundwater monitoring equipment

Table 4. Summary of past, ongoing and planned Donor-funded Projects (NEA, 2018)

4.2.1.4 National Food Agency³⁰

The National Food Agency (NFA), a Legal Entity of Public Law (LEPL), through its Phyto-sanitary Department and regional phyto-sanitary centres, operates 24 web-based agrometeorological stations, all in the Kakheti region (Telavi, Akhmeta, Kvareli, Lagodekhi, Gurjaani, Signagi, Sagarejo and Dedoplistskaro municipalities). They are mostly designed for forecasting and warning of pest outbreaks. All of these stations can measure meteorological parameters, soil temperature, humidity and phenological parameters. Out of these 24 stations, 10 agrometeorological web-based monitoring stations were recently installed at 10 locations of Kakheti with assistance from FAO. Climate information generated through a General Packet Radio Service (GPRS) system is processed by the server located in Austria - Imeteos, a provider of the agrometeorological stations, where forecasts for pest outbreak/plant disease risk are made and sent online to NFA's central office and through it to local service centres. These stations measure the following parameters:

- /// Air temperature
- /// Relative humidity
- /// Precipitation
- /// Wind velocity
- /// Solar radiation
- /// Leaf wetness duration/leaf moisture
- /// Raindrop size

Figure 10 below shows the Google map location of agrometeorological stations operated by the NFA.

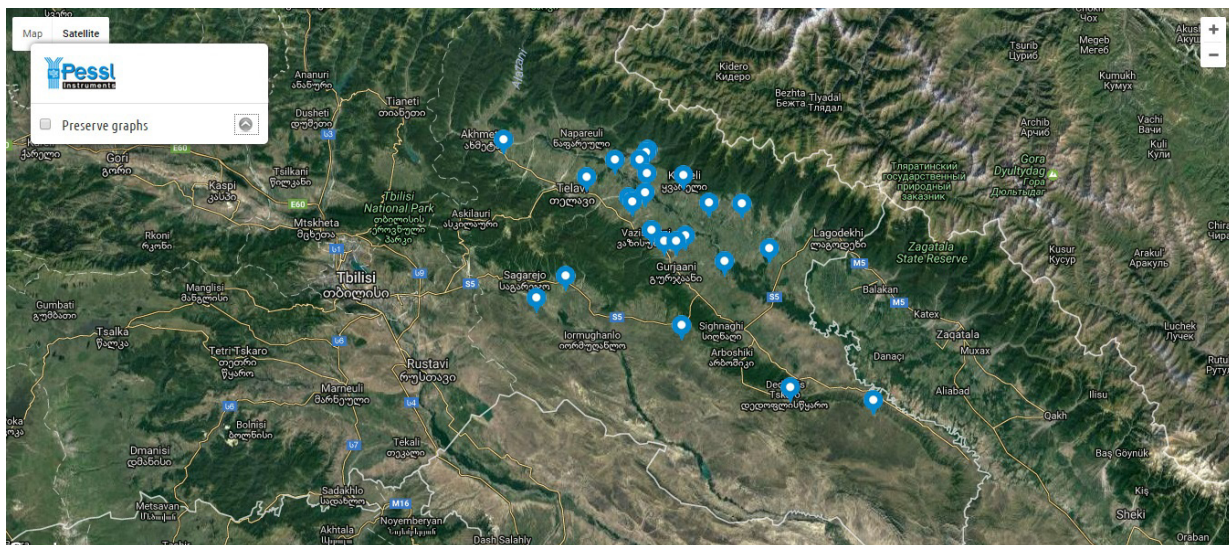


Figure 10. Locations of NFA's agrometeorological network

4.2.2 Emergency Management Service³¹

At present, the highest body for managing all types of emergency situations at the national level is the Emergency Management Service (EMS), established in December 2017 as a merger of the State Security and Crisis Management Council (SSCMC) under the Prime Minister's office, and the Emergency Management Agency (EMA) under the Ministry of Internal Affairs. Specifically, the EMS is mandated to:

³⁰ Source: i) Charter of National Food Agency. <http://nfa.gov.ge/uploads/other/7/7000.pdf>; ii) Interview with NFA representatives; iii) Feasibility Study, Annex II. GCF Funding Proposal.

³¹ Source: i) EMS's and EMA's charters; ii) interview with EMS's and EMA's staff; iii) Feasibility Study-Annex ii. GCF Funding Proposal

- // Identify, analyse and assess disaster risks;
- // In coordination with central and local authorities and various other organizations, plan and implement disaster prevention/mitigation measures;
- // Coordinate disaster preparedness actions;
- // Coordinate disaster response and civic protection activities (search, rescue, recovery, evacuation and rehabilitation);
- // Coordinate engagement of civic volunteers in response activities;
- // Develop recommendations for the Prime Minister during nation-wide emergencies;
- // Establish an EWS, including collection and processing of disaster risk data;
- // Set up and operate the National Crisis Management Centre (NCMC);
- // Organize and provide logistical support to the Inter-Agency Crisis Management Operations Centre during nation-wide emergencies;
- // Assign specific mandates/responsibilities to central and local authorities, organizations and individual persons in the field of state security;
- // Training/retraining of NCMC staff; and
- // Public awareness on disaster risk management and reduction.

The EMS is mandated to elaborate proposals on preventive and response measures to political, socio-economic and environmental threats of national importance. It also manages the NCMC that is directly overseen by the Prime Minister during nation-wide emergencies. Specific functions of the NCMC are as follows:

- // Notify the Prime Minister on all types of nation-wide crisis situations;
- // Coordinate/organize preparation of all types of national crisis management and contingency plans;
- // Coordinate implementation of disaster risk prevention and mitigation activities, as well as response and recovery activities, during national-wide emergencies;
- // Coordinate inter-agency cooperation during nation-wide emergencies; and
- // Establish a crisis management database.

Under nation-wide crisis circumstances, the emergency situation is announced country-wide and the Situation Room under the EMS is activated. The Room is equipped with modern IT and communications technologies, provided by the State Military Scientific-Technical Centre DELTA that enables the EMS to systematize and analyse information received from various state authorities. High-level decision-makers are gathered in the Situation Room and manage agency-specific crisis management activities.

The EMS coordinates development and implementation of relevant DRR strategies and plans. In 2016-2017 under the leadership of the SSCMC, a National DRR Strategy and an Action Plan were developed, which are the major DRR policy documents at present. The EMS is also assigned to carry out socio-economic vulnerability assessments and develop risk maps and databases, including an e-library. However, at present it lacks the necessary resources and capacities to perform such tasks.

At the operational level, crisis management, including “last-mile early warning³²”, was ensured by the EMA, which with last year’s reform moved under the auspices of the EMS. The main functions of the EMA included:

- // Coordination and organization of civil security actions across the country;
- // Emergency response and recovery;
- // Establishing an EWS;

32 The last connection from an EWS directly to people affected

- // During nation-wide emergencies, requesting and coordinating work of international rescue and humanitarian missions in Georgia;
- // Setting up field operation centres through participation of regional and local authorities, patrol police and others; and
- // Development of relevant regulation in the area of emergency management.

In terms of EWS, the center is responsible for creating a disaster database and communications system and “last-mile warning” targeting national, regional and local governments, patrol police, various organizations and the population directly or through field operation centres that are created during nation-wide emergencies. Recently, the virtual data server for the DRR GIS-compatible computer programme Geonode-2.4-b22 was installed at the Operation Control/Management Centre of EMA with technical assistance from the French Government under the EU Twinning programme and with financial support of the State Security Service of Georgia. This geoinformation portal allows the user to create thematic maps by developing various GIS layers and upload and download spatial data to the portal. It is further planned to integrate digital hazard maps developed by the NEA, GIS land inventory data contained at the Web Map Service (WMS) of the National Agency of Public Registry (NAPR) and other spatial data stored with various national agencies and institutions at “Geonode2.4-b22”. The Centre ensures receipt, processing and response to emergency signals transmitted through the 112 Service. All this information is logged in a common information and analysis system. The Centre receives and processes this information and immediately sends warnings to relevant authorities either through e-mail or SMS. During nation-wide disasters, the Centre sets up field operational centres. With a change of institutional structure subordinating the EMA to the EMS and transferring its assets to the latter, the operation of geoportal needs to and should be adapted to the new institutional situation.

According to the regulation on a Unified System of Emergency Situation Management, the warning/risk information and communication/exchange with other states and international organizations are made according to the relevant international agreements. The EMS is in the process of developing a database of assets (available heavy machinery per administrative units, etc.) for contingency planning. In addition, the DRR Centre under the NGO RDFG/DRR Centre intends to assist the EMA to enable prompt data collection, handling and dissemination using modern technologies. NEMIS is a user-friendly information management software platform for emergency situations. This system provides situational awareness for emergency management institutions’ activities, logistics and development, and gap analysis to generate real-time reporting and seamless information sharing.

Before the December 2017 institutional restructuring, communication of warning signals was conducted in the following way and by the following means:

- // The NEA prepared and delivered timely warnings on impending natural hydrometeorological events to decision-makers (heavy precipitation, floods, hailstorms, snow avalanches, strong winds, droughts).
- // The spring flood and long-term weather forecasts (monthly and seasonal) were also regularly produced and delivered to the interested customers. More specifically, for floods, the NEA is responsible for the first stages of the dissemination of flood warnings.
- // A water level bulletin published by the NEA on a daily basis detailing information about all operating stations was sent to the President’s Administration, the SSCMC, operators of hydropower plants and other users upon request. Information is/was also available through NEA website, where all the information from the different automatic weather stations, hydrological stations and meteorological forecast information can/could be accessed by any interested user.
- // Based on the NEA’s information on climate-induced disasters, the SSCMC defined whether or not the event was of ‘major’. In case of a major event, it coordinated communications and response, while in case of minor events the EMA was in charge of communications and response.
- // The EMA used the eFlow system, SMS and cell phones to inform the heads of regional emergency management units and teams, and Regional Governors, mayors and emergency services of the potentially affected areas. The main channels used for disseminating warnings to commu-

nities were the media, the national radio communications network and loudspeakers installed on cars. The NEA also provided information to the potentially affected municipalities by using similar means.. In addition, the EMA was actively using patrol cars with voice speakers (patrol offices are available everywhere within the country).

Given the recent merger of the SSCMC and the EMA, the past communications/information flow needs a significant change. The regulation on EWS was recently prepared by the EMA and submitted to the Legal Department for review and approval. It suggests the following EWS architecture composed of three blocks/pillars:

1. The First block (first-mile communications/warning) is composed of data/information generating and supplying agencies/entities, including the 112 Service under the MIA, the Joint Operational Centre under MIA (CCTV cameras), civil security objects, monitoring and warning services (e.g. NEA) and settlements (communities, villages).
2. The Second block is composed of information management agencies/entities, including emergency management operational centres, the inter-agency emergency management operational centre and emergency crew/teams of organizations and agencies.
3. The Third block (“last-mile communications³³/warning”) is composed of information dissemination agencies/entities, including operators and owners of postal and electronic communications systems, the Public Broadcast System of Georgia, the Patrol Police of the MIA and other local communications means.

The following communications/warning means are considered as technical means under the suggested EWS system:

- /// Sirens
- /// Voice signals/locators installed on transportation means
- /// Electronic signs – electronic monitors/information banners
- /// TV and radio
- /// Land and mobile telephone lines
- /// Internet
- /// Other means – walkie-talkies, community wardens, etc.

4.2.3 Ministry of Internal Affairs

Joint Operations Centre (JOC). 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 the 112 Service. The Centre includes a video surveillance system with national coverage, which is used in the monitoring of various emergencies including those caused by natural hazards, and dissemination of warnings.

Given the movement of the EMA from the MIA to the EMS, the Centre’s surveillance data and communications means should be integrated into the nation-wide EWS (e.g. EMS’s database and communications system). Currently, the MIA through a national regulatory agency has been working with all mobile operators for transmission of emergency information via SMS to the population at no charge. The French Government will assist in strengthening its emergency alarm system (mainly the automated network of road cameras/visual sensors).

112 Service. The 112 service is a Legal Entity of Public Law of the MIA, which ensures an operational response to emergency situations. The main purpose of the 112 service is to protect human lives, as well as private and public property. The 112 service is the Emergency Response Centre that receives emergency calls from all over Georgia via the unified emergency number 1-1-2. The 112

³³ transmission of an early warning at local level, the last step of the way to public

service is free of charge from all fixed line and mobile networks, even if the number is disconnected from both sides or there is no SIM-card in the mobile phone.

The 112 service unifies three different services in Georgia, being the patrol police, fire/rescue and medical services. The 112 Emergency Response Centre ensures processing of received calls and transferring them to the relevant services.

4.2.4 Ministry of Regional Development and Infrastructure³⁴

The Roads Department under the Ministry of Regional Development and Infrastructure (MRDI) contains different units, among them the **Riverbank Protection Service**, that is mandated to provide riverbank rehabilitation and fortification works. It also has the Environmental and Safeguards Service responsible for ensuring environmental compliance of structural measures subject to Environmental Impact Assessment (EIA) and positive Environmental Decision. One of the priorities of the Roads Department is development of roadside AWS network and early warning system against extreme weather events (e.g. rainstorms, snowstorms, freezing – so-called “black ice”) for safe driving purposes. Several AWSs have been installed on the roads with assistance of various bilateral donors during the period 2015-2017.

The Department for Relations with Regions and Local Governments (LGs) is in charge of national coordination of activities by Regional Governors’ Offices and LGs, development and supervision of implementation of national regional development policies, the Law on the Development of Mountainous Regions and the National Programme of Mountainous Regions.

The Department for Implementation of Regional Projects performs various functions, including participation in identification and endorsement of regional infrastructure projects to be implemented through the support of the State Fund for Implementation of Regional Project, collection and analysis of data on such projects, and oversight/monitoring of the progress of implementation of regional infrastructure projects etc. The Department is also the major body responsible for developing recommendations for measures on rehabilitation of regional infrastructure damaged from natural disasters, as well as for supervising their implementation. More specifically, it reviews and endorses planned rehabilitation measures, develops recommendations on allocation of funds from various state authorities, and conducts monitoring/oversight of implementation of rehabilitation measures etc.

The Municipal Development Fund (MDF) is a Legal Entity of Public Law under MRDI in charge of funding and/or implementing infrastructural projects of state and local importance in Georgian provinces. It is overseen by a Supervisory Board and managed on a daily basis by an Executive Director. The Supervisory Board is composed of the Prime Minister, Ministers and deputy Ministers of various line Ministries, as well as representatives of Parliamentary Committees.

The Spatial Planning Department. Most recently, spatial planning functions from the MoESD were transferred to the MRDI. These includes development and coordination of implementation of a state policy on land use, land use zoning, urban development and spatial planning, including facilitation/coordination of development of masterplans for land use, land use zoning documents, urban development plans and spatial zoning documents, and development of technical methodologies for land use and spatial planning.

4.2.5 Ministry of Internally Displaced Persons from the Occupied Territories, Health Labor and Social Affairs³⁵

As a result of the most recent institutional restructuring reform, functions of the Ministry of Internally Displaced Persons from the Occupied Territories, Accommodation and Refugees of Georgia (responsible for Ecomigrants also) except for construction/rehabilitation of houses, migration/interna-

³⁴ Source: <http://www.mrdi.gov.ge/ge>

³⁵ Source: <http://www.mra.gov.ge/geo/static/9289>

tional protection, and repatriation, have been assigned to the newly established Ministry of Internally Displaced Persons from the Occupied Territories, Health, Labor and Social Affairs. The other functions have been distributed among the MRDI and MIA. Specific allocation of tasks, including those with respect to Ecomigrants, has not been identified during the report preparation period and it will be defined during the next 6 month period as stipulated by the amendments to the Law on Structure, Authority and Rules of Operation of the GoG (05/07/2018).

4.2.6 Ministry of Economy and Sustainable Development (MoESD)

The MoESD includes a specialized agency - **the Georgian State Hydrographic Service**³⁶, the national coordinator for navigational warnings, consisting of navigational systems and equipment located on the coast of Georgia, signs placed in the open sea to provide safe navigation (48 ground-based and 34 sea from ground-based, 22 units in occupied territory). The service comprises three main departments:

- // **Navigational Marks/signs, Technical Services and Monitoring Department:** operates and maintains navigation signs and related infrastructure, keeps records of geographic coordinates, location of navigational signs, operates emergency alarm system, includes an operational/control centre with online monitoring system and electronic navigation map, keeps an online operational database and provides continuous data on navigation signs, and produces relevant reports.
- // **Hydrographic Survey and Cartography Department:** conducts bathymetric surveys and observation of sea depths, conducts micro-bathymetry measurements, collects data from ports and anchorage regions, monitors change of the coastline, maintains an inventory of navigational marks and lights, geodetic and bathymetric characterization of ports and harbors/docks under construction. It also publishes "Notice to Mariners", notifying/providing warning to sailors and appropriate services to changes with regard to marine navigation as well as develops navigation maps, schemes, navigational route maps, etc.
- // **Weather Forecast Department:** regular monitoring of the weather, weather forecasting, storm warnings, meteorological events' record keeping, establishment and operation of electronic database.

4.2.7 Ministry of Defense

State Military Scientific-Technical Center Delta³⁷ is engaged in the defense industry and provides technical support for the Georgian armed forces in terms of ammunition, military vehicles, specialized buildings and fortifications, implementation/application of new weapons systems and their subsequent support, humanitarian demining and demilitarization works. It has recently elaborated, installed and tested an anti-hail system in the Kakheti region of Georgia, which consists of a radar located on Mount Chotori, in the village of Nukriani, and an information and fire control centre, as well as autonomous rocket systems.

From 2018, the anti-hail system is operated by the CCNH, a limited liability company (100% government-owned), which will closely work with the Institutes of Geophysics and Hydrometeorology on research and development of technological and methodological innovations, to be technically supported by Delta.

4.2.8 Ministry of Justice

The Ministry of Justice through its National Agency for Public Registry (NAPR)³⁸ is responsible for

³⁶ Source: <http://gshs.gov.ge/en/>

³⁷ Source: <http://www.delta.gov.ge>

³⁸ Source: <https://napr.gov.ge>

geodetic and cartographic works, including land registration, cadastre and the setting up and operation of a GIS. More specifically, **the Department for Geodesy and Cartography** is in charge of developing state policy, the legal-regulatory and methodological basis for geodesy, cartography and GIS systems, as well as for coordinating and carrying out geodetic/cartographic activities/projects, including topographic, gravimetric and aerial photographic ones, and satellite data generation and processing, setting up and operating the GNSS stationary reference stations (GEO-CORS), registering real property cadastre data and developing, standardizing and operating a GIS, including creation and operation of the central geospatial database.

4.2.9 Georgian Air Navigation (Sakaeronavigatsia)³⁹

Georgian Air Navigation is a limited liability company (100% government-owned). It is in charge of managing air traffic within the Georgian airspace through monitoring and providing aviation services and flight safety in takeoff and landing zones at the international airports of Tbilisi, Kutaisi, Batumi and Mestia. More specifically, its major functions are:

- /// Management of air traffic movements;
- /// Provision of radio-wave, lightning and other communication systems;
- /// Meteorological Service; and
- /// Aeronautical information services.

The Meteorological Service is part of “Sakaeronavigatsia”. This Service consists of the Tbilisi, Batumi and Kutaisi meteorological offices, which are responsible to provide meteorological information for flights to/from these city airports. The Tbilisi meteorological office provides meteorological flight information for Mestia airport according to a contract with the NEA. The Meteorological Service conducts permanent observations of meteorological conditions (weather elements) for each operating airport region, produces day/night aviation forecasts, forecasts for take-off and landing, and also provides aviation customers including the World Operative Meteorological Data (OPMET) bank with this information. Meteorological observations at these airports are done using new automatic sensors produced by well-known manufacturers: Vaisala (Finland), Thies Clima (Germany), Eliasson (Sweden), Biral (England), Setra (England), L-3 Communication Avionics Systems, Inc. (U.S.A.), Rotnic (Germany). The Service has one radar installed at the Tbilisi International Airport. There is a plan for purchasing and installing a second radar at Kutaisi International Airport.

4.2.10 Ministry of Education, Science, Culture and Sports (MoESCS)

Traditionally, the MoESCS conducts (quarterly or more frequently) emergency trainings, including evacuation drills in secondary schools as well as emergency response trainings for parents of schoolchildren. In the past, this was carried out in close cooperation with the EMA under the MIA. Currently, the major responsible body for emergency management in Georgia is the EMS. Evidently, the MoESCS will continue its DRR education activities in cooperation with the EMS as well as the EIEC. Based on National DRR Strategy and Action Plan, educational TV programmes on DRR are also envisaged.

4.2.11 Regional and municipal authorities

Concerning DRR, according to the current Law on Civil Safety, local governments are responsible for:

- /// Design and implementation of disaster prevention measures;
- /// Design and approval of disaster preparedness and response (contingency) plans;

³⁹ Source: <http://airnav.ge/index.php?page=ms&fullstory=49>

- Development and approval of disaster risk management plans together with the EMA;
- Evacuation and shelter of affected people;
- Distribution of humanitarian aid;
- Emergency response and recovery activities; and
- Communications, awareness raising and trainings.

According to the Law on Civil Safety, local authorities have the right to create local fire-fighting and rescue forces/divisions that should be used during local emergencies.

Regional governors' offices are responsible for coordinating emergency activities within their region and as well liaising between central and local authorities.

Concerning climate change adaptation, municipal authorities are engaged in the implementation of riverbank protection and infrastructure rehabilitation measures, financed either through the central or municipal budget. In some cases, the central and local government co-finance disaster prevention/mitigation and rehabilitation measures.

A quick survey of local authorities (except for the AAR and Tbilisi Mayor's office) using a simple qualitative questionnaire was conducted as part of this study. Of all municipalities surveyed, only 31 submitted filled-in questionnaires. Below is a map of responses from the targeted municipalities.

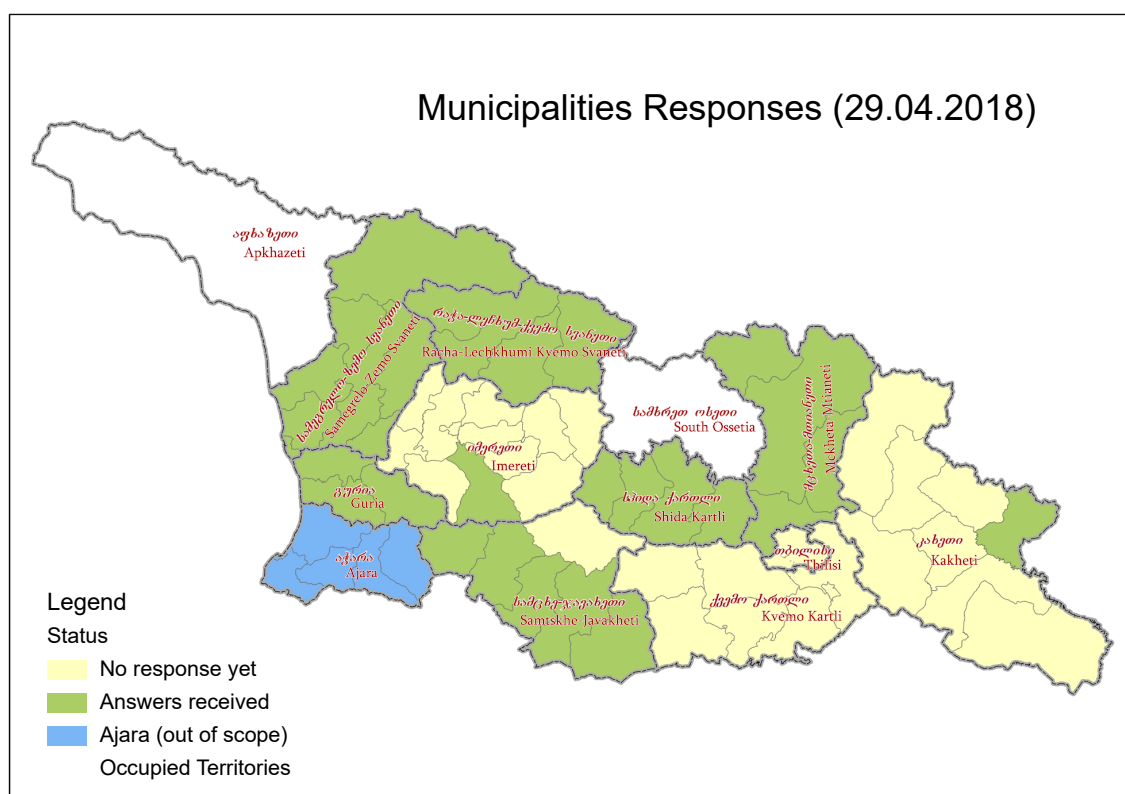


Figure 11. Response to questionnaires by municipalities (GEO rapid survey, 2018)

Compilation and analysis of information contained in the filled-in questionnaires revealed the following:

- None of the municipalities responding have any structural unit for emergency management⁴⁰. Only one municipality - Abasha responded that it has one specialist on emergency management which coordinates disaster prevention, mitigation and response activities with regional and relevant central authorities.

⁴⁰ Seven municipalities out of eight of the Kakheti region, and Kvemo Kartli and Imereti regions, did not submit any response to the questionnaire.

- None of the municipalities undergo regular DRR/CCA trainings, although some sporadic trainings with assistance of the NEA and various NGOs were conducted.
- The absolute majority of municipalities do not have emergency preparedness and response plans (only two municipalities - Kaspi and Tsageri out of the total 31 municipalities responded positively).
- The majority of municipalities responded (61%) that they finance DRR/CCA measures, though while specifying the responses, many municipalities stated that funds are allocated from state budget;
- Up to 50% of municipalities responding stated that disaster and climate change hazards and risks are assessed in their municipalities by the NEA, EMA, the MoESD, the Irrigation and Drainage Company and the MoEPA, SDC, CENN and local municipalities (Akhaltzikhe, Senaki, Tianeti, Lagodekhi).

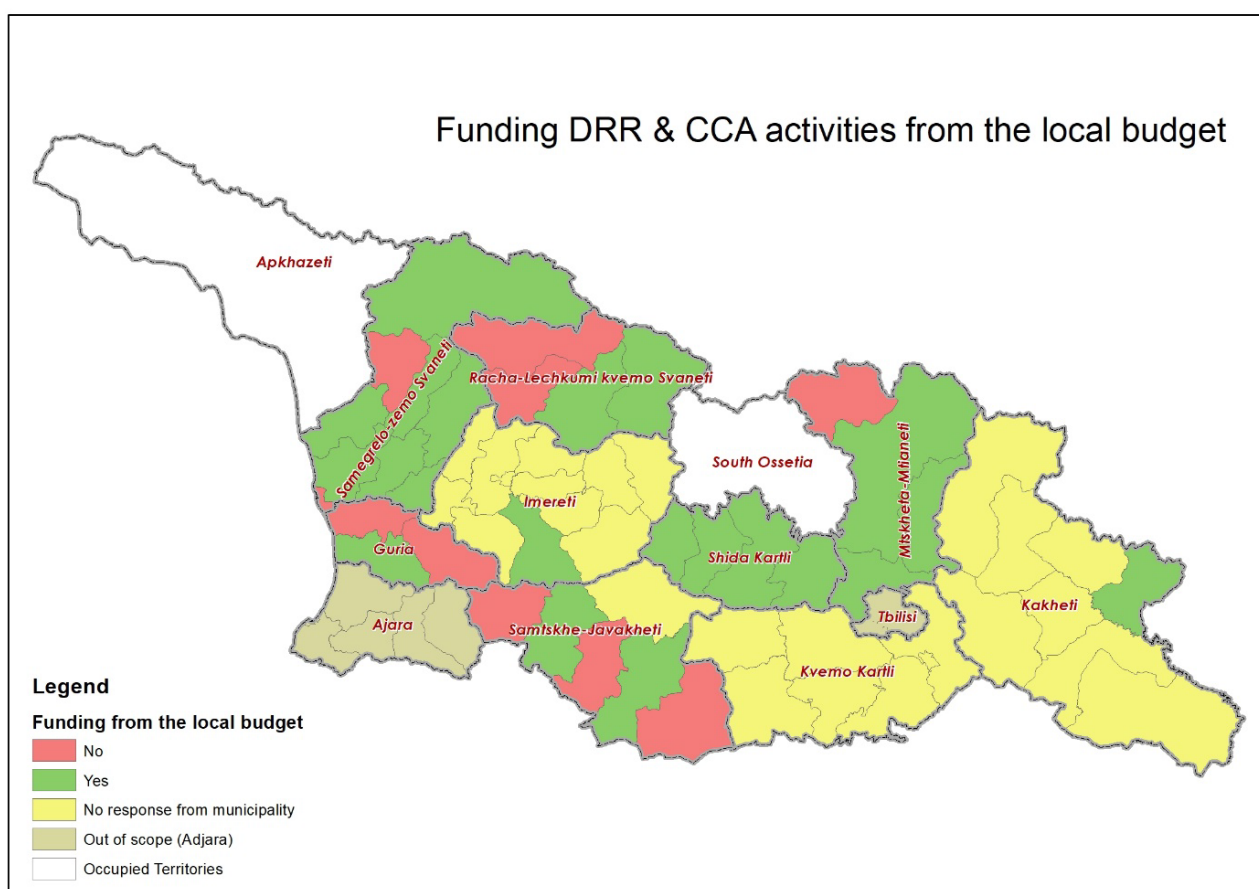


Figure 12. Funding of DRR/CCA activities by municipalities (GEO rapid survey, 2018)

Region	Municipality	Expenditure (GEL)	Comment
Kakheti	Lagodekhi	2015 – 100,989.09 2016 – 368,964 2017 – 337,278.6	
Mtskheta-Mtianeti	Dusheti	2016 - 2,626,600 2017 - 551,100	Expenditure is made by central government
	Mtskheta	120,000	
	Tianeti	2015 – 427,540 2016 – 123,869 2017 – 286,650	

Shida Kartli	Gori	2015 - 398,750 2016 - 280,000 2017 - 25,000	
	Khashuri	Annual average 500,000-1,000,000	
	Kareli	2013 - 49,800 2014 - 933,262.5 2015 - 186,278.74 2016 - 153,499.28 2018 - 140,000	2018 – construction of storm water drainage system
	Kaspi		Amount is not indicated
Samtskhe-Javakheti	Akhaltzikhe	2017 - 115,247 2018 - 32,483	
	Akhalkalaki	2015 - 24,200 2016 – 43,959 2017 – 24,190 2018 – 115,995	Mitigation of strong wind impacts – rehabilitation Works
	Ninotsminda	2017 - 30,000	Reserve Funds
Racha-Lechkhumi and Kvemo Svaneti	Oni	60,000	
	Ambrolauri	2016 - 190,550 2017 - 14,000 2018 - 250,000	
Samegrelo-Zemo Svaneti	Martvili	20,000-40,000	
	Senaki	2017 - 93,000	River bank protection
	Zugdidi	2015 – 72,898 2016 – 230,979 2017 – 8,041	River bank protection
	Khobi	2013-2017 – 3.8 million	
	Abasha	2016 - 57,515 2017 - 1,399,998	
	Tchkhorotsku	2016 – 32.1* 2017 – 22.1 2018 – 45.0	
	Mestia	Up to 2018, annually 300,000-500,000 2018 - 20,398,564	River bank protection
Guria	Ozurgeti	2017 - 26,510	

Table 5. Funding of DRR/CCA activities in municipalities responding to the survey (GEO rapid survey, 2018)

*- Monetary unit is not indicated. It is most likely in terms of thousand GEL.

4.2.12 Tbilisi City Hall⁴¹

Given the high concentration of population and infrastructure in the city of Tbilisi, the Tbilisi City Hall (Mayor's Office) is considered separately in this report. The Mayor's Office does not have a separate resilience/DRR response unit within its structure, although some of its divisions are directly or indirectly engaged in DRR/CCA activities. Currently, the 100 Resilient Cities project is ongoing within the City Hall, under which the resilience plan for the city of Tbilisi is being developed. An upcoming GCF project will assist the Mayor's office in strengthening resilience capacities within the office (establishment and capacity building of resilience unit/team or alternatively, resilience officer), developing a multi-hazard response plan for the city of Tbilisi, developing SOPs and a communication protocol for DRM, setting up of a multi-agency DRM platform at the city level, developing (a) feasibility study(ies) for some of the priority structural measures included under the 2015 Tbilisi Post-disaster Need Assessment (PDNA) and the 2015 Tbilisi Disaster Recovery and Vulnerability Reduction Plan.

Tbilisi Environmental Protection Service. This Service is engaged in developing an environmental and ecosystems management policy for the city of Tbilisi; development and coordination of the implementation of the policy for the management of municipal forests within the boundaries of Tbilisi; setting up common standards for recreational and landscape/recreational zones; and setting up a database on natural hazards.

The Service consists of four divisions: i) Forest Policy; ii) Permits and Monitoring; iii) Environmental Management; and iv) Landscape Planning division. The Environmental Management division of the Service by its charter participates in the identification of natural disaster risks, planning of risk reduction measures, assessment of climate change impacts on the urban environment and CCA options and development of relevant recommendations. Given that the Service does not have capacities to carry out risk assessments nor to establish the relevant database, it closely cooperates with the NEA in that regard. In the near future it is envisaged to hire a geologist under the Service.

Tbilisi Urban Development Service. The Service by its charter is responsible for development of sustainable urban development policies and coordination of their implementation, carrying out urban development studies, management of new construction activities, and the development/maintenance of a GIS database, including data on natural hazards specific to Tbilisi. The Service consists of three divisions: i) Urban Policy Development and Analysis; ii) Urban Management; and iii) Urban Planning and Development. The Service actively cooperates with the NEA, the Statistics Office and the EMA in assessing natural hazards and risks specific to Tbilisi.

Tbilisi Infrastructure Development Service. Based on its charter, the Infrastructure Development Service is responsible for:

- /// organizing construction, rehabilitation and O/M of the urban infrastructure, including stormwater runoff drainage canals, river bank protection canals and tunnels; and
- /// monitoring of damaged buildings, including those damaged by natural hazards and implementation of restoration/reconstruction works.

The organization and supervision of construction and rehabilitation works for riverbank protection, drainage or other infrastructure is a primary responsibility of the Technical Infrastructure Construction and Rehabilitation Division. During these processes, the staff of the Division cooperate with the NEA's Geology and Hydrometeorology Departments only after the geological review commissions reconstruction work for the damaged infrastructure.

Architecture Service. Based on its charter, the Architecture Service is responsible for identification of construction conditions for allocated land lots, agreement/approval of architecture/construction designs/projects, issuance of construction permits and their modification/renewal. The Service has interactive map (www.maps.tbilisi.gov.ge), which has various layers of spatial information, including land cadastre data, territorial/structural zones, functional zones, limited zones and infrastructure. It is planned to integrate the NEA's database on geological hazards into the GIS database of the Architecture Service.

⁴¹ Source: i) interview with the staff of Tbilisi City Hall; ii) Statute of Tbilisi City Hall; iii) Feasibility Study-Annex II. GCF Funding proposal; iv) PDNA. <http://www.undp.org/content/undp/en/home/librarypage/crisis-prevention-and-recovery/pdna.html>; v) Tbilisi Disaster Recovery and Vulnerability Reduction Plan. 2015. http://www.ge.undp.org/content/georgia/en/home/library/environment_energy/tbilisi-disaster-recovery-and-vulnerability-reduction-plan--2015.html

4.3 Non-governmental Organizations (NGOs) active in CCA/DRR field

4.3.1 Caucasus Environmental NGO Network (CENN)⁴²

Concerning CCA/DRR, the CENN was and continues to be involved in DRR capacity building, hazard and risk mapping and developing a hazard and risk atlas and web-portal, climate change and DRR participatory hazard, vulnerability and risk assessments at community and municipal level. The CENN is also involved in the development of local CCA and DRR action plans, design and implementation of CCA and disaster risk prevention measures in pilot areas of Georgia, e.g. Adjara, Kakheti, Samegrelo-Zemo Svaneti, Racha-Lechkhumi etc. Active donors for CENN are USAID, SDC, Austrian government and international NGOs.

CENN is a national partner for the GEF project “Global Forest Watch” (GFW), which is being implemented by the MoEPA and World Resource Institute (WRI). Under the project, natural hazard maps for forest cover were prepared.

CENN operates the Caucasus Knowledge Portal, which enables users to get environmental information, literature, reports, interactive maps etc. In addition, the mobile application GreenWatch, a citizen’s grievance mechanism enables user to take a picture of an environmental problem and send it to CENN. These notifications are then sent to the relevant authority(-ies) for an appropriate response and action.

CENN conducts regular DRR and CCA trainings for journalists, school students, state agencies and other organizations. It works with a network of informal environmental clubs established in secondary schools across the country.

4.3.2 ASB Georgia (Arbeiter-Samariter-Bund Georgia)⁴³

The ASB in cooperation with the Government of Georgia works on:

- /// IDRR trainings – the main objective of the trainings is to increase knowledge on natural hazards and develop skills to better prepare for, respond to and mitigate disasters.
- /// First Aid trainings – practical and lifesaving information on how to administer first aid to a person until doctors arrive. The training module is adapted to the needs of the particular audience (child-centred first aid for preschool representatives) and people with no medical background. Trainings are delivered by the Georgian Samaritan Association (SSK), internationally certified trainers.
- /// Disaster Management Committees – are formed by members of a particular institution and community members to assess the disaster preparedness capacity of their institution, and to plan and undertake risk reduction activities.
- /// Simulation-Evacuation Drills – are at the core of all DRR projects. ASB DRR programme staff, together with national and local emergency management agency representatives, carry out simulation drills for the project beneficiaries to practice their technical skills and knowledge obtained during the trainings.
- /// DRR Educational Materials - DRR educational material and methods have been designed specifically to address the needs of young Georgian children and children with special needs. The materials were approved by the Emergency Management Department of the MIA and the MoESCS of Georgia.
- /// Advocacy for the mainstreaming of disability-inclusive DRR into local, regional and national strategies and policies, particularly in the sector of pre-school education, to ensure that all children despite their physical and/or mental abilities are covered by the policies and are included in DRR activities.

⁴² Source: i) Interview with CENN; ii) www.cenn.org; iii) Feasibility Study – Annex II to GEF Funding Proposal

⁴³ Source: <http://www.asb-georgia.org/en/projects/55-disaster-risk-reduction>

- Provision of DRR equipment, such as fire extinguishers, first aid kits, megaphones, evacuation signs etc, to create a safer environment in target institutions and enhance their response capacity.

4.3.3 BRIDGE – Innovation and Development⁴⁴

BRIDGE is a Georgian-based NGO established in 2015 through assistance of Oxfam with a purpose of poverty reduction in Georgia. Together with the international organization “Save the Children”, BRIDGE implements the DIPECHO-funded project “Supporting Disaster Risk Reduction in (the) South Caucasus”. The project is being implemented in Kakheti, Mtskheta Mtianeti and Adjara; its aim is to strengthen resilience of vulnerable groups and local self-governments, by means of strengthening preparatory measures and response models for disaster impact reduction.

The project goal is raising awareness of vulnerable groups and local government on DRR and implementation of the models for the management of disasters, with the participation of women and men, vulnerable groups, people with disabilities, youth and the elderly population. One of the directions of the project is the support of the National Resilience Forum, which ensures development of the platform composed of all stakeholders from different fields, engaged in activities related to DRR, climate change, adaptation and environment. Within the frame of the Project, DRR resource centres are established in target regions. Local rescue personnel are selected and retrained. Small mitigation projects are implemented, which were selected in accordance with the interests and priorities of the local population.

4.3.4 Caucasus Network for Sustainable Development in Mountain Regions (Sustainable Caucasus)⁴⁵

Currently the Scientific Network for the Caucasus Mountain Region (SNC-mt) through its Coordination Unit (Sustainable Caucasus) is implementing the Inception Phase of the project “Strengthening Climate Adaptation Capacities in the South Caucasus” with financial support from the Swiss Cooperation Office-South Caucasus. The overarching goal of the project is to reduce the population’s vulnerabilities towards climate-induced hazards and foster regional cooperation on adaptation challenges in the Caucasus.

The project seeks to mobilize SNC-mt’s trans-national and cross-sectoral expertise in order to help consolidate and mainstream activities of the Swiss Cooperation Office in South Caucasus and furthermore, to embed hazard mapping in the larger context of DRR, which is a core feature of sustainable mountain development under Agenda 2030. The project has the following six core components that will be implemented over a three- to four-year period:

- Component 1: Hazard Mapping and DRR University Courses.
- Component 2: Further development of spatial data infrastructure and regional knowledge generation.
- Component 3: Regional training, exchange and capacity building of young scholars.
- Component 4: Support to organizing Caucasus Mountain Forum bi-annually.
- Component 5: SNC-mt capacity building and networking.
- Component 6: Enhancing the dialogue and cooperation with targeted stakeholder groups. This component will be focused on the identification of the gaps and weaknesses in cooperation and dialogue between development sector scientists and practitioners in the Caucasus.

⁴⁴ Source: <http://www.bridge.org.ge/en/projects/disaster-risk-reduction/>

⁴⁵ Source: www.sd-caucasus.com

4.3.5 Georgian Red Cross Society (GRCS)⁴⁶

The GRCS actively works in Georgia on development and implementation of methods for disaster and emergency preparedness and response, capacity building of local communities in this area and awareness-raising on DRR. During emergency situations, it activates operational/field centres and ensures first aid access for the affected population and distribution of humanitarian goods to them. Moreover, it coordinates the work of NGOs engaged in recovery and rehabilitation works. It has 37 territorial offices and disaster preparedness and response groups, composed of 240 volunteers in all regions of Georgia. Since 2013, GRCS through the support of the International Committee of the Red Cross (ICRC) has been implementing the project “Support to the Preparedness and Response to Emergency Situations”, a DRR programme implemented in four cities of Georgia: Tbilisi, Kutaisi, Gori and Senaki. Under the project, preparedness and response teams have been established, each composed of 20 volunteers. These teams have been trained in DRR, including preparedness and response. Members of these volunteers’ teams have been equipped with extinguishers and other equipment and are fully ready to be engaged in fire extinguishing and other response and rescue activities. Apart from this project, since 2010 the GRCS has been implementing the Programme for Creating Safe Communities in Georgia. Imereti, Racha-Lechkhumi and Kvemo Svaneti are target regions, which are mostly mountainous and susceptible to natural disasters. Under the programme, DRR educational and information materials have been distributed among local population, as well as 20-member volunteers’ teams have been established, trained and equipped with Personal Protection Equipment (PPE) kits. With participation of all relevant stakeholders, Community Contingency Plans have been prepared, including contingency plans for households. Furthermore, under the programme vulnerability and coping capacities are being assessed. Since 2013, a similar project for increasing community resilience/response capacities has been implemented in the villages of Busheti, Telavi municipality, Sagarejo and Kvareli. Under the project, local communities are trained in DRR, educational materials are distributed among local stakeholders, vulnerability and coping capacity assessment is conducted and a pilot resilience/risk reduction project is implemented.

From 2013 through 2017, the Georgian Red Cross in cooperation with various Civil Society Organizations (CSOs) in Georgia and at regional level was engaged in the Climate East I and II Programmes supported by Europe Aid, the Austrian Development Agency and the Austrian Red Cross. The recent Climate East II project had an objective of strengthening the capacities of six existing national CSO CCA networks and individual CSO network members to contribute to national and local policy-making processes, public awareness raising, and education on climate change and environmental governance in the Eastern Neighbourhood Region⁴⁷.

4.3.6 REC Caucasus (RECC)⁴⁸

Since 2016, the RECC has been implementing the UNEP/GEF project “Applying Landscape and Sustainable Land Management (L-SLM) for mitigating land degradation and contributing to poverty reduction in rural areas”. The project aims to integrate sustainable management of landscape and land resources in national policies and the existing institutional framework, for the purposes of introducing economically effective mechanisms in rural areas, which will provide economically valuable practices for rural communities. It consists of the three following components:

1. Implementing policy, regulatory and institutional reforms in the field of landscape/sustainable land management;
2. Demonstration of the benefit of implementing best practices of landscape/land resource management; and
3. Improving national capacities and awareness management.

⁴⁶ Source: 1) interview with GRCS representatives. 2) www.redcross.ge

⁴⁷ Source: <https://climateforumeast.org/30/Who-we-are>

⁴⁸ Source: 1) Interview with RECC representative; 2) <https://www.rec-caucasus.org/>; 3) MoEPA’s project database.

Under the project, the following concrete outputs will be produced:

- // National legal and policy framework related to Landscape and Sustainable Land Management (L-SLM) sector reviewed and recommendations for harmonizing existing L-SLM framework developed. Relevant policy and proposed amendments prepared and submitted for endorsement to the relevant governmental entities.
- // Needs assessment report addressing national institutional framework (including coordination) in Georgia to deliver positive L-SLM adaptive management elaborated and considered by national authorities (including MoEPA, MRDI, MoESD).
- // Land degradation web-portal with maps at 1:200,000 scale for the entire Georgian territory is prepared and disseminated to governmental institutions and other stakeholders.
- // Vulnerability profiles for Gardabani, Dedoplistskaro and Akhmeta municipalities established and local demonstration plans developed; recommendations on longer-term efforts made.
- // A package of L-SLM demonstration activities piloted in agricultural and livestock production areas (up to 6 ha per each pilot site) delivering real social and environmental impacts (e.g. in agroforestry/ windbreak management, pasture management and soil protection).
- // Training conducted on L-SLM practices targeting at least 100 national/sub-national decision-makers and local/community representatives.
- // Knowledge of L-SLM practices developed and disseminated.

RECC has been also coordinating the EU PPRD programme which aims to prevent disasters, and improve preparedness and response within the Eastern Partnership EU Neighbourhood Programme. More specifically, the project aims at disaster risk prevention, preparedness and response capacities in target countries, including Georgia. It supports the development of an online regional hazard and risk atlas and public awareness raising.

4.3.7 Association Rural Development for Future Georgia (RDFG)/DRR Center

One of the RDFG/DRR Centre's missions is to increase the resilience of local communities to disasters caused by man-made and natural hazards, and promote the establishment of strategic and systematic disaster management approaches on regional and central levels of government. Through its DRR Centre in cooperation with the GoG, assists central and local authorities as well as local communities DRR, through trainings, awareness-raising, education, analytical research and policy drafting. Through Mercy Corps support and SDC's financial support in 2016-2017, it implemented the project "Capacity building of municipal DRR Working Groups and Municipal DRR focal points" under the Alliances Lesser Caucasus Programme (ALCP). The goal of the project was to raise DRR Working Groups' and DRR Focal Points' capacity in eleven targeted municipalities of Kvemo Kartli and Adjara, as well as advocate for and work with regional and national governments where required. The project was implemented in close collaboration with the MoESCS, the EMA of the MIA and the Millennium Challenge Account Georgia.

The project activities were carried out in Kvemo Kartli (Bolnisi, Gardabani, Dmanisi, Tetritskaro, Marneuli, Tsalka) and Adjara (Khulo, Keda, Khelvachauri, Kobuleti, Shuakhevi), and consisted of the following activities:

- // Preparation of a research report on Georgian policy and existing legislative regulations on DRR and animal disease prevention, considering the competences and powers of the local self-governments/municipalities, while indicating the laws which are or can be used to strengthen the ALCP-facilitated municipal and regional DRR mechanism.
- // Build the capacity of DRR WG's and DRR focal points in their day-to-day activities to plan and develop cost-effective and locally-appropriate measures to prevent local disasters, including animal diseases. The RDFG will work with the DRR Focal Point to collect, analyze, use and regularly update data to help them understand and carry out their duties related to information

dissemination to the local population, including both male and female farmers.

- /// Provide trainings for the municipal DRR WGs and municipal DRR focal points in Kvemo Kartli (Bolnisi, Gardabani, Dmanisi, Tetritskaro, Marneuli, Tsalka) and Adjara (Khulo, Keda, Khelvachauri, Kobuleti, Shuakhevi).
- /// Develop written recommendations based on the DRR Guidelines that can be used in the long-term.

In August 2013, the Government officially requested the UN Country Team to provide support in conducting a comprehensive assessment of existing national DRR capacities and development of a roadmap for strengthening the national DRR system, through the inter-agency mechanism of Capacity for Disaster Reduction Initiative (CADRI). Overall, the assessment revealed that there is high government willingness and potential to move from a reactive approach of disaster response to a more pro-active DRR approach. However, national leadership needs to be backed up by concrete actions, dedicated capacities, enabling legislation and necessary resources aimed at reducing existing risks, avoiding creating new risks, and improving preparedness for efficient response to disasters. The assessment also identified a number of challenges regarding the national preparedness and response, including lack of capacities for proper information management and crisis communication. The RDFG developed the project proposal and detailed work plan for establishment of the National Emergency Information Management System (NEMIS). The NEMIS is a user-friendly information management software platform that builds the Common Operating Picture in development and humanitarian contexts. This solution provides situational awareness for programme activities, logistics, development and gap analysis to generate real-time reporting and seamless information sharing. Utilizing a synchronization engine, the system works offline and is fully functional when the internet is sporadic or unavailable. It is fully customizable and provides evidence-driven insights to support informed decision-making about planning and effective use of resources. NEMIS breaks complex tasks into easy-to-understand guided steps to minimize errors and visualize critical factors.

The RDFG is also involved in a rural development project in Tetritskaro municipality under the EU-funded ENPARD project, which encompasses participatory planning and implementation of priority interventions for the municipality, including CCA, sustainable natural resources management and DRR measures.

4.3.8 Ecovision

Ecovision is an environmental organization with a mission to raise public environmental awareness and support the implementation of environmental policies and therefore, reduce the negative impact of humans on nature. Ecovision with the support of the Georgia Red Cross under the programme “Climate Forum East” (CFE II), financed by the EU, Austrian Development Cooperation and the Austrian Red Cross, has led a process of participatory development of CCA plans for Dedoplistskaro, Ambrolauri and Khelvachauri municipalities.

4.3.9 ED – Environment and Development

ED-Environment and Development has recently been involved in the “Assessment of Suitable Flood Mitigation Measures in Tbilisi, Georgia”. The main objective of this technical assistance project was to improve the flood risk management in the Tsavkiskhevi River basin. This was accomplished through the implementation of a modelling framework, the inclusion of climate change impacts, the definition of flood maps and the designation of flood mitigation and adaptation measures. More details on the project are included in the second baseline report **Assessment of Hazard Mapping System in Georgia and Road Map**.

4.4 Academic and research institutions

4.4.1 Tbilisi State University (TSU)

TSU has one nature science faculty, with Geology and Geography Departments and Bachelor's (BS) and Master's (MS) degree programmes offering such courses as geomorphology, physical geography, landscape planning, cartography, hydrology, oceanography, meteorology, natural hazards of Georgia (BS course), hydrological processes (BS course), natural hazardous processes and risk factors (MS course), modeling of hydrological processes (MS course), flow dynamics and river channel processes (MS course), environment and natural disasters.

Sixteen scientific-research institutes are subordinated to TSU, of which the Institute of Geography and the Institute of Geophysics are working on climate change and disaster risk assessment. Of these, the Institute of Geophysics works on seismic hazard assessment and monitoring. In the recent past, the Institute was also engaged in multi-hazard assessment and mapping. In the near future, in joint cooperation with the Institute of Hydrometeorology, the Institute of Geophysics will be engaged in research and development related to hail early warning and operation of an anti-hail system run by the Centre for Controlling Natural Hazards.

The Institute of Geography among other issues works on natural hazards research. It has implemented several projects in this area, including "Geo-ecological State of the Kakheti Region and the Way for its Improvement". In 2012 the Institute prepared and published Georgia's national atlas, which among various thematic maps includes hazard maps of landslides and mudflows. It is planned to issue an English version of the Atlas in 2018.

4.4.2 Ilia State University

Ilia State University (Iliauni) has natural science and engineering faculties, which consist of undergraduate, graduate and post-graduate programmes, including geography and GIS technologies, geology and geophysics. The Institute of Earth Sciences and Seismic Monitoring Centre is one of the research institutes of the University, studying/managing seismic and related geological hazards and risks in Georgia. In 2017-2018, this institute conducted a multi-disciplinary hazard study of Nino Jvania Street and its adjacent area (Varaziskhevi district of Tbilisi), upon the request of the local population and considering public interest⁴⁹. Details on this study are given in the second baseline study developed under the UNDP/SDC CCA project inception phase and entitled **Assessment of Hazard Mapping System in Georgia**.

4.4.3 Georgian Technical University (GTU)

GTU has a mountain geology faculty, with undergraduate, graduate and post-graduate programs in Geology. Below is a table on DRR-related programmes and courses taught at GTU.

Programme	Course/Subject	Degree	Faculty
Geology	Workplace Safety in Geological Facilities and Management of Emergency Situations	BS	Mountain Geology
Geology	Engineering Geodynamics	BS	Mountain Geology
Engineering Safety and Emergency Management	Natural and Biological Disasters	BS	Mountain Geology

⁴⁹ Source: <https://ies.iliauni.edu.ge/?news=nino-jvania-street-report&lang=en>

Engineering Safety and Emergency Management	Protecting Urban Settlements from Natural Hazards through Architectural and Urban Planning Methods	BS	Mountain Geology
Engineering Safety and Emergency Management	Management of Emergency Situations	BS	Mountain Geology
Mountains and Geoengineering	Assessment and Expertise of Landslides	BS	Mountain Geology
Mountains and Geoengineering	Industrial Accidents and Disasters	BS	Mountain Geology
Mountains and Geoengineering	Natural and Biological Disasters	BS	Mountain Geology
Mountains and Geoengineering	Basics of Engineering Geodynamics	BS	Mountain Geology
Mountains and Geoengineering	Hazardous Geological Processes	BS	Mountain Geology
Geology	Workplace Safety in Geological Facilities and Management of Emergency Situations	BS	Mountain Geology
Geology	Engineering Geodynamics	BS	Mountain Geology
Engineering Safety and Emergency Management	Natural and Biological Disasters	BS	Mountain Geology
Engineering Safety and Emergency Management	Protecting Urban Settlements from Natural Hazards through Architectural and Urban Planning Methods	BS	Mountain Geology
Engineering Safety and Emergency Management	Management of Emergency Situations	BS	Mountain Geology
Mountains and Geoengineering	Assessment and Expertise of Landslides	BS	Mountain Geology
Mountains and Geoengineering	Industrial Accidents and Disasters	BS	Mountain Geology
Mountains and Geoengineering	Natural and Biological Disasters	BS	Mountain Geology
Mountains and Geoengineering	Basics of Engineering Geodynamics	BS	Mountain Geology
Mountains and Geoengineering	Hazardous Geological Processes	BS	Mountain Geology

Table 6. GTU courses related to Emergency Management/DRR

There are several research institutes under the GTU, including the Water Management Institute, Hydrogeology and Geoengineering Institute and Hydrometeorology institute. One of the research topics of the Water Management Institute is natural disasters, including risk management of floods and erosion/mudflow processes and development of preventive measures through application of various engineering technologies. The Institute has the following testing and modeling laboratories:

- /// Hydro-technical laboratory;
- /// Hydraulic laboratory;

- // Mudflow modeling laboratory;
- // River bed processes modeling laboratory;
- // Pumping stations;
- // Sea and Ocean storm modeling laboratory; and
- // Soil erosion and water resources management laboratory.

The current condition of the Institute including testing laboratories and equipment is poor.

The Institute of Hydrometeorology established in 1953 is composed of several divisions related to the management of natural hazards, including:

- // Water resources and hydrological modeling/forecasting division;
- // Climatology and agrometeorology division; and
- // Division for modeling of man-made and natural disasters.

Since 2000 until now, the Institute of Hydrometeorology has been actively involved in donor- and government-funded projects related to the environmental security of the Supsa Oil terminal and pipeline and transport corridor projects, as well as modeling of hazardous processes of the Black Sea and various rivers in Georgia. It will be actively involved in research and development of technological and methodological innovation for hailstorm warning and an anti-hail system in cooperation with the Institute of Geophysics and the Centre for Controlling Natural Hazards.

4.5 Donors

Major donors active in Georgia in CCA/DRR are (more details on ongoing donor projects are discussed in section 4.1 above):

- // SDC, supporting capacity development for DRR and hazard mapping (development of capacities of academic institutions in DRR and hazard mapping, supporting the implementation of resilience measures in Supsa, Kintrishi and Chorokhi watersheds);
- // UNDP supporting preparation of the FNC to UNFCCC through financial assistance from the GEF, as well as establishment of a near-real-time multi-hazard early warning system across the country through financial assistance from the GCF and SDC;
- // GCF supporting enabling activities for the GCF National Designated Authority, as well as establishment of a near-real-time multi-hazard early warning system across the country through UNDP and SDC's co-financing;
- // UNEP/GEF supporting introduction of landscape and sustainable land management practices;
- // Caucasus Nature Fund (CNF), KfW and GiZ supporting development of a protected areas system in Georgia as well as forestry sector reform;
- // Polish and Czech governments supporting the hydrometeorological services in Georgia;
- // French government through EU Twinning programme helped EMA purchase and install virtual data server for the DRR GIS-compatible computer programme Geonode-2.4-b22;
- // EU supporting adoption of major provisions of the Flood Directive, improvement of water quantity monitoring, development of river basin plans for certain pilot basins and implementing a pilot DRR/CCA including climate-smart agricultural measures under its rural development projects piloted in a number of municipalities under the ENPARD II and III programmes;
- // EU/DIPECHO through UNICEF Georgia in cooperation with ASB and MoESCS supported integration of DRR in education (middle-school) in 2010-2015;
- // SIDA supporting establishment of information/data management systems in line with EU standards;

- // FAO supporting development of agrometeorological monitoring and advisory services;
- // World Bank supporting rehabilitation of irrigation/drainage systems in selected priority areas and capacity development of institutions responsible for irrigation/drainage management under an ongoing USD 50 million project “Irrigation and Land Market Development” (2014-July 2021)
- // The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) through GiZ supporting: i) the project “Capacity Development of South-East, East Europe, South Caucasus and Central Asian Countries in Implementing CC Policies”, 3rd phase (2017-2021), including study of EU climate change and energy directives and the 20/20/20 Agenda, a study of national climate change mitigation and adaptation policies; and ii) development of a National Spatial Arrangement Plan and Spatial Arrangement and City Plans for selected municipalities.

HCT acts as a humanitarian coordination structure performing under the leadership of UN Resident Coordinator (RC)/Humanitarian Coordinator. Following the request of the GoG for humanitarian assistance, the RC/HC activates the HCT, which then immediately convenes a first meeting following a disaster’s onset and helps to set the direction for response to the same.

The RC as the UN Designated Official for Security convenes a Security Management Team (SMT) meeting to discuss critical response activities, risk assessment and security capacity, which involve all international and national staff. In the first 24 hours, the HCT:

- // reviews and activates the inter-agency contingency plan;
- // agrees on the scale of the crisis, immediate needs, and priority sectors/geographic areas;
- // assesses response capacity gaps;
- // reviews operating conditions, including staff welfare, logistics and access;
- // reviews existing coordination structures and/or agrees new arrangements to fill gaps;
- // determines and requests initial external support and initial funding needs;
- // determines sequence/timing of inter-agency needs assessments, response planning, and monitoring;
- // decides on the relevance of preparation of a flash appeal;
- // agrees daily reporting and public information/media engagement procedures including developing a crisis communication plan and key messages for headquarters-level press and advocacy materials; and
- // agrees on the response coordination inter-agency mechanisms/cluster activation and vis-à-vis the GoG.

The RC in consultation with the HCT determines the frequency of HCT meetings.

In general, the GoG bears overall responsibility for the management and coordination of the humanitarian action through the EMS, led by the Prime Minister. The EMS implements its decisions through relevant government executive emergency structures including the NCMC, line ministries and local authorities. International humanitarian assistance is aimed to support the GoG’s response efforts and its delivery and coordination needs that should be aligned with the Governance response plans and coordination schemes.

Coordination of local NGOs’ involvement is a subject of an agreement between the HCT and the Georgia Red Cross Society. The RC maintains an ongoing dialogue with donors and holds regular donor coordination meetings on the evolution of needs, results achieved and funding received throughout the response.

5.0

Capacity gap and comparative analysis of existing systems and practices in the areas of climate change adaptation and disaster risk reduction against obligations of international agreements and, national statutory and policy requirements

5.1 Current status of implementation of international obligations and national statutory and policy requirements in the CCA realm and associated capacity gaps

In this sub-chapter, CCA capacity gaps and needs were identified against the status of implementation of international commitments and national statutory and policy requirements. The status of compliance vis-a-vis these commitments and national policy requirements, and related capacity gaps and needs, are as follows:

CCA governance. Under the UNFCCC, Georgia is obliged, on a regular basis, to develop and submit to National Communications (NCs) to the Secretariat of UNFCCC. According to NC guidelines, NC reports should include assessments of climate change trends and predictions as well as vulnerability assessments. So far, Georgia is in compliance with this requirement and currently is in the process of developing the 4th National Communication. The overall quality of the NCs is considered good, although a “lessons learned” study conducted for the 2nd and 3rd NCs by UNDP Georgia in 2017 revealed that due to the data gaps in hydrometeorological sector for certain years (e.g., the 1990s and 2000s) and incomplete coverage of the country by the observation network, climate change assessments and predictions contain many uncertainties and errors. Moreover, a sound QA/QC system is not established for climate change impacts and vulnerability assessments, which also adds to the quality problems of the NCs. Furthermore, until now priority ecosystems and some economic sectors were covered by the climate change vulnerability studies, while it would be more advisable to use a regional approach and prioritize ecosystems and economic sectors taking into consideration regional/municipal peculiarities as was done for the AAR. More than that, it is advisable to focus on adaptation measures and their prioritization using cost-benefit analysis methods, and to make more efforts to integrate these into sectoral strategies. Many of these gaps are currently being addressed by the 4th NC process, as well as by recently completed or ongoing projects; e.g., the National Adaptation Plan (NAP) for the agricultural sector was already developed and adopted. Agriculture and Rural Development Strategies contain measures on climate adaptation, including climate smart agriculture.

Chapter 4 of the EUAA (Articles: #308 and #310) calls for: i) research, development, diffusion and deployment of safe and efficient climate adaptation technologies; ii) mainstreaming climate considerations into sectoral strategies; and; iii) development and implementation of a National Adaptation Programme for Action (NAPA) with no concrete schedule defined for it. The second and third priorities are also outlined in the INDC and NEAP-3.

Regarding development of a national adaptation policy framework, based on stakeholder consultations facilitated by UNDP, the country opted for elaboration and adoption of a National Adaptation Plan (NAP) rather than a NAPA, as is also reflected in the NEAP-3. For this purpose the Georgian NGO NALAG, with USAID’s financial assistance, has developed a Road Map for National Adaptations, which along with micro-scale assessment of vulnerabilities to climate change in various sectors, includes recommendations for adaptation actions, although only in very general terms. Thus, the requirement for developing a NAP is still not met. Currently, the MoEPA is in the process of elaborating project proposal through UNEP on the development of a NAP for submission to the GCF.

Concerning sectoral adaptation plans, such a document only exists for the agricultural sector and part of the road infrastructure, while there are no adaptation plans for other important sectors (e.g. water resources management, drinking water supply, energy, tourism, forestry, infrastructure development etc.) and vulnerable ecosystems (e.g. mountainous areas).

As for research, development and diffusion of adaptation technologies, work in this realm is very limited. Until now, in the agricultural sector, crops of mass production are used and little or no attention is paid to local landraces and endemic species which are more adapted to local conditions and are less input-demanding crops. Moreover, in the irrigation/drainage sector, traditional non-efficient technologies are used and newer ones such as drip and sprinkle irrigation are used only at the pilot level. Use of bioengineering, including agroforestry for stabilizing slopes and riverbanks, is not a common practice either. In the drinking water sector, water use inefficiency, including high losses in rural systems, is a major problem.

By decision 1/CP.21, paragraph 22, the UNFCCC Conference of the Parties (COP) calls its members “to communicate their first nationally determined contribution (NDC) no later than when the Party submits its respective instrument of ratification, acceptance, approval or accession. If a Party has communicated an intended nationally determined contribution (INDC) prior to joining the Agreement, that Party shall be considered to have satisfied this provision unless that Party decides otherwise”⁵⁰. Based on this decision, Georgia who ratified the Paris Declaration (effective from 2016) decided to develop and submit to the UNFCCC Secretariat its NDC no later than the end of 2019. During the development of this document, the country will pay particular attention to the CCA part, having no concrete measurable indicators and targets for implementation of determined measures. The project proposal is being developed by the MoEPA (through its Environment and Climate Change Department) for submission to GCF to receive financial support from the fund.

Under the current INDC, many actions of which are also included in the NEAP-3, Georgia commits itself to take steps towards integrating climate risk and resilience into development planning and implementation, build capacities of central and local authorities in CCA, introduce climate-smart adaptation technologies and practices, conduct research and development, prepare emergency response plans to address climate-induced natural hazards affecting agriculture, implement various land reclamation measures, build farmers’ capacities in adapting to climate change impact, establish an early warning system for climate extremes, and build coping capacities of local communities to address climate change/disaster risks. Moreover, in the forestry sector, the country undertakes a non-conditional commitment to Implement afforestation/reforestation activities on an already identified 1,500 ha of degraded lands by 2030, and assist natural regeneration of forests through different silvicultural methods on 7,500 ha by 2030. Under the terms of conditionality (if external assistance is provided), the country commits itself to afforest/reforest up to a total of 35,000 hectares, as well as support relevant activities for natural regeneration in identified areas needing afforestation/reforestation until 2030. The INDC also notes that for implementing the majority of the above measures, significant efforts to attract international aid will be required. Therefore, the country should work extensively towards this goal.

Concerning implementation of adaptation measures outlined in INDCs, as was mentioned above there is no national planning framework for CCA, integration of climate change considerations into development and sectoral strategies is weak and there is no inter-agency coordination mechanism for climate change, including CCA. In the near future, an inter-ministerial NDC committee will be established to deal with development and coordination of implementation of the NDC, as well as accessing GCF funding for various CCA and CCM projects.

Capacities of central and local governments towards CCA adaptation planning and implementation are weak. Except for the MoEPA, other line ministries do not have contact persons/focal points for climate change and their knowledge on climate change is limited. In local municipalities, CCA plans are absent, funds are limited and local knowledge on climate hazards and risks is practically non-existent. While Georgian cities are very actively engaged in CCM through participating in the Covenant

50 Source: <https://unfccc.int/process/the-paris-agreement/status-of-ratification>

of Mayors and developing and implementing Sustainable Energy Action Plans (SEAPs)⁵¹, none of the cities have joined the Mayors Adapt – the Covenant of Mayors Initiative on Climate Change Adaptation.

A fully-integrated near-real-time multi-hazard early warning system covering the entire country, including local communities for climate-induced natural hazards, does not exist; however, more or less advanced ones are present for some rivers (e.g. Rioni, Duruji, Amlak) and a limited number of hazards (e.g. floods, landslides, mudflows). Drought forecasting and early warning capacities are extremely limited and their hydrometric network is not dense or modern enough to cover all river basins and give a representative, valid picture of hydrometeorological parameters in an operative regime. Rain and water discharge gauges are lacking, a fact that limits operational synoptic and flash-flood forecasting. Moreover, agrometeorological monitoring is limited to 35 stations, 10 stations operated by the NEA across the country, and another 25 stations all located in the Kakheti region and operated by the NFA. Groundwater monitoring was resumed in 2013 and is limited to 51 sampling sites, including 45 wells. This is insufficient coverage for all groundwater basins in Georgia, and thus does not provide a representative picture on the status of groundwaters and the impacts of climate change on them.

There is no common practice in the country for applying climate information by various sectors and end-users, including irrigation/drainage, hydropower, roads/traffic management, insurance and agricultural sectors. Currently, these activities are limited to providing advice to farmers on the use of pesticides, based on climate conditions. This is done by the NFA under the MoEPA.

As mentioned above, the NEA is the major body responsible for hydrometeorological and geological monitoring and forecasting, but does not yet have a user-friendly, standardized, open-source database on hydrometeorological and geological parameters and climate-induced natural hazards. The bulk of the information stored/archived at the NEA is on paper or in a user-unfriendly electronic format. Much of the information, which NGOs, academic and research institutions and development projects require for research, educational and development purposes is neither available online nor free-of-charge.

Implementation of CCA strategies and plans. Despite the integration of sustainable natural resources management and climate-smart agricultural practices into Georgia's Agriculture and Rural Development Strategies, and the pilot-level use of integrated natural resources management and sustainable land and forest management, current typical natural resources management and agricultural practices are still unsustainable and do not take into consideration climate change impacts (e.g. absent/limited agriculture land and crop rotation, limited use of climate and pest-resistant crops, land cultivation on steep slopes and in perpendicular to slopes, absent/limited use of no-till farming, absent/limited use of efficient irrigation and drinking water technologies, overgrazing of pastures and forests, unsustainable logging, including clear-cutting, logging of steep-sloped forests, over-logging, damming/river modification, etc.).

CCA measures implemented are more reactive than pro-active; e.g., construction/rehabilitation of hard riverbank protection structures, agriculture and storm-water drainage systems, rehabilitation of damaged infrastructure. Such measures as land use planning/zoning, application of climate-resistant designs, buildings and materials, restoration and maintenance of natural watersheds, wetlands, river buffer zones, floodplain forests, development of agroforestry and using it for slope stabilization, afforestation/reforestation and natural forest regeneration are only practiced at a very limited scale.

CCA financing. Concerning CCA financing, an economic assessment of the impact of hydro-meteorological hazards under climate change conditions conducted during the feasibility study for the GCF project proposal, 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 (51.2 million USD) without climate change and at 282.7 million GEL (124.4 million USD) with climate change. The risk to agricultural land from all hazards is between 251,225 ha and 325,020 ha under

51 23 cities, including Tbilisi have already signed the agreement

baseline and climate change conditions respectively. Annual damages to agriculture from flooding alone would be 126.3 million GEL (55.6 million USD) and 154.2 million GEL (67.8 million USD) under baseline and climate change conditions respectively. 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 that are expensive to build, provide a limited standard of protection and have a limited service life. Current hazard risk management practices also tends to rely more on emergency response once a disaster unfolds, with limited forecasting of such events and insufficient prior warning to the population; 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 DRR.

Annually, the GoG invests a significant amount of state funds in post-disaster recovery and DRR, funded through the reserve funds of the President and Prime Minister's Office (as managed by the Ministry of Finance), budgets of the sectoral ministries, including the Municipal Development Fund (MDF) and municipalities' budgets. Funds are primarily spent on the rehabilitation of roads and bridges, water supply systems, energy infrastructure (transmission lines, sub-stations, pipelines, etc.) and on various buildings, as well as on the purchase of houses for ecomigrants and direct compensation of the affected population. According to official data, 68.369 million GEL was spent in 2014-15 from the Prime Minister's reserve funds for the Roads Department, construction companies, the AAR, the United Water Supply Company of Georgia and local municipalities, of which 46.264 million GEL was spent in 2014 and 22.05 million GEL in 2015. The MRDI through its Roads Department during the period 2007-2014 spent 46.960 million GEL on the rehabilitation of road infrastructure, including construction of flood defence structures. Average annual spending by the Roads Department was about 5 million GEL in 2014-15. The MDF in 2013-17 spent 29.961 million GEL on rehabilitation/construction of riverbank protection structures and storm water drainage systems, of which 1.343 million GEL was GoG financing and 28.619 million GEL came from donor financing. The chart below shows the percentage share of total financing by various funding sources.

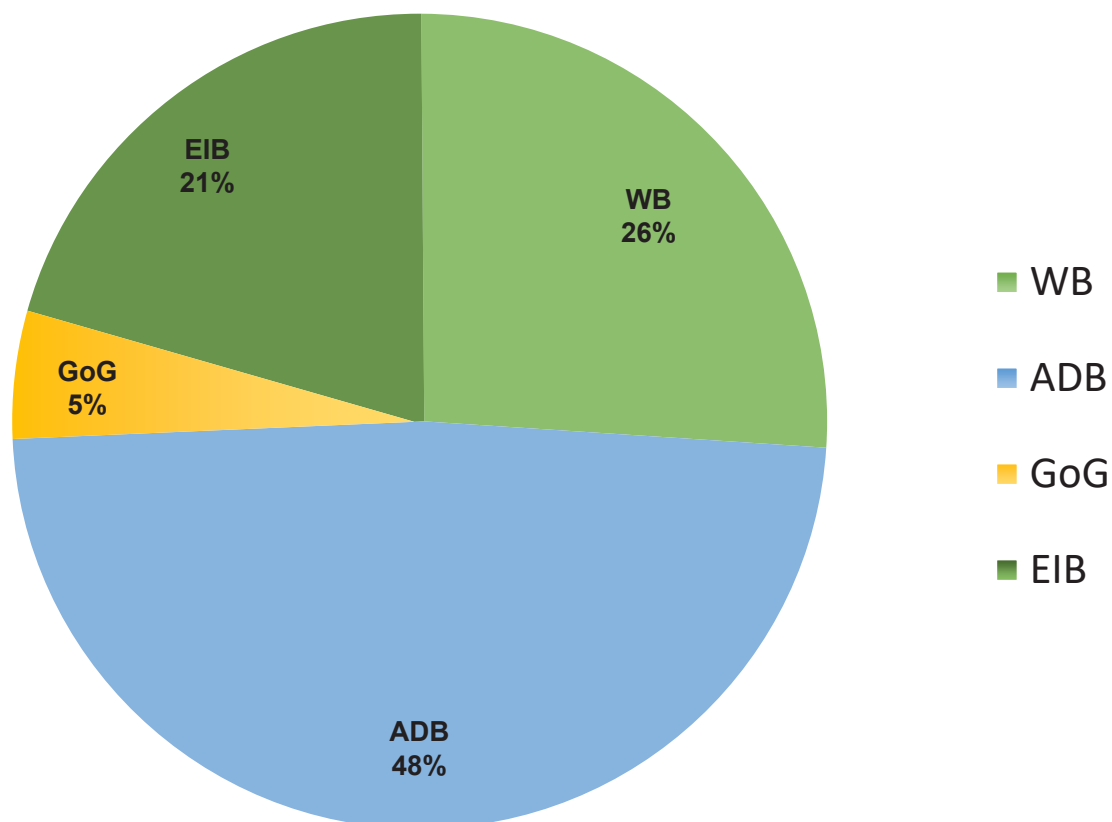


Figure 13. Contribution of various funding sources to total MDF 2013-2017 spending in CCA/DRR
(Source: MDF, June 2018)

Thus, the total amount spent on recovery and rehabilitation works annually is significant, but is still very small compared to annual average losses.

A dire situation exists in terms of financing hydrometeorological and geological monitoring and forecasting services. The NEA's budget's dynamics, related to hydrometeorological and geological monitoring and forecasting, shows an alarming decreasing trend for 2017-18 and the 2019 forecast, that is related to removal of one of the largest source of financing for the NEA (royalties from natural and mineral resource use licences). Figure 1 below shows the NEA's actual expenditures for 2017-18 and its estimated budget for 2019 that is to be spent on hydrometeorological and geological monitoring, forecasting and hazard assessments.

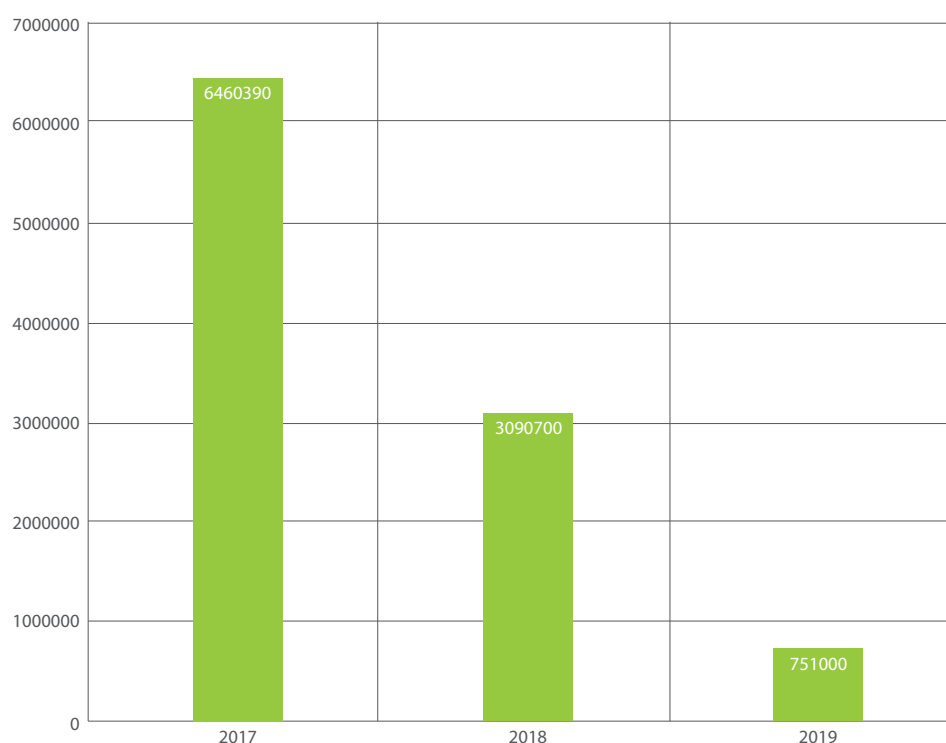


Figure 14. NEA's hydrometeorological and geological monitoring, forecasting and assessment budget (NEA, 2018)

5.2 Current status of implementation of international obligations and national statutory and policy requirements in the DRR realm and associated capacity gaps

Concerning the implementation status of priority actions from the Sendai Framework, the INDC, obligations stemming from the EUAA and major national statutory and policy requirements (e.g., the NEAP-3 and National DRR Strategy), the following gaps have been noted:

- // **DRM/DRR governance, including legal-regulatory, policy and planning frameworks.** Until 2018, the State Security and Crisis Management Council was a focal point for the Sendai Platform. With recent restructuring, the newly established EMS becomes the focal point for the Framework and will require significant capacity building in order to properly coordinate implementation of the Platform in Georgia. Until now, no active work is being carried out to establish the Sendai National Platform. In the recent past, the MoENRP, (now the MoEPA), through its special unit was responsible for establishing and coordinating the national platform for the Hyogo Framework, and significant progress was achieved in this direction. However, in 2017 the unit was abolished and the national process for the Hyogo Framework was stopped. Thus, within the new institutional setting, there is a need for reactivating the national platform or setting up a new one in support of global DRR processes under the EMS's leadership and monitoring the implementation of the Sendai Framework in the country.

Under the current DRR institutional setting, there is a need to clarify and delineate the roles of various state authorities regarding disaster prevention, including early warning systems and coordina-

tion of response, recovery and rehabilitation activities, and the roles of state and local authorities in these areas. For early warning systems, it is necessary to develop a detailed protocol, including a data flow and communications protocol, and assign clear roles to the parties involved. In the national legislation, classification of emergencies needs to be clearly stated, which includes introducing concrete criteria for them. Standard Operational Procedures (SOPs) should be developed for all authorities involved in DRR management, and continual professional training/re-training programs established and implemented for staff of relevant authorities. Particular attention should be paid to local authorities having no units/personnel dealing with DRM/DRR, local threat assessments, emergency management and risk management plans and adequately trained professional staff.

Until now, there is no common Government-led HCT and thus there is a need to establish an information sharing/coordination centre to provide various levels of coordination links:

- /// at national level - between the EMS and HCT represented by the RC/HC;
- /// at sectoral level - between the line ministries and cluster lead agencies; and
- /// at local level - between the EMS and local authorities and specific programme coordinators.

The UN HCT and GoG relationship and related coordination procedures need to be formulated and commonly agreed.

According to existing laws on Civil Safety and Emergency Management, the EMS is a designated authority for coordinating development and implementation of national policy on emergency management, including preparedness (inclusive last-mile communication under EWS), along with response, recovery and rehabilitation works. It also supports the Prime Minister at the political level in decision-making in regard to emergency management. Since the EMS is a newly-established entity it needs significant capacity building in terms of effective performance of its duties.

Furthermore, existing Emergency Management and Civil Safety laws require the development of a National Civil Safety Plan and Emergency and Risk Management Plans for individual entities (state and local authorities and other organizations engaged in emergency management) of the unified state emergency management system. For strategic planning purposes, the above-mentioned laws stipulate establishment of an advisory panel by decree of the Prime Minister. Such a structure has not yet been created.

The current Civil Safety Plan does not reflect the new institutional setting and needs significant revision/update. Regarding the national DRR strategy adopted in 2017, although it contains the most updated information on the institutional setting, it lacks a detailed assessment of climate-induced hazards, vulnerabilities and risks, including hazard and risk maps. As for planning frameworks at the level of individual entities of the unified state emergency system, e.g. municipalities, there are no multi-hazard risk reduction plans at regional/river basin and/or municipal levels, nor preparedness and response plans at municipal levels, including for the city of Tbilisi with the highest population size and concentration of critical infrastructure.

The national DRR strategy requires development of reserves (including material and financial reserves) for emergency situations at all levels, including state government, individual institutions, regional governors' offices and local self-governments, reserves that are critical for the country. In this regard, the direst situation exists in local municipalities having insufficient reserves for emergencies.

The new Law on Civil Safety currently requires establishing a volunteers' system, including volunteers' registry, training centres for volunteers in local municipalities, creation of volunteer groups and development and implementation of training/capacity building programmes for such volunteers. Until now, there is no such system established and operational in the country.

- /// **Risk knowledge⁵².** There is very limited information and knowledge in the country on climate-induced natural hazards, vulnerabilities of communities and potential risks.

⁵² Detailed analysis of hazard assessment and mapping capacities are given in the second baseline report: Assessment of Hazard Mapping System in Georgia and Action Plan/Road Map.

Commonly-agreed, international standards-based, multi-hazard, gender-sensitive vulnerability and risk assessment methodologies do not exist. Approaches that are currently applied for climate-induced hazard assessment and mapping by the NEA do not necessarily follow EU and other international requirements/standards.

Data on climate and geological parameters necessary for hazard mapping and assessment are lacking due to limited hydrometeorological, agrometeorological and geological monitoring, limited field assessments, and under-developed regional radar and ground-level lightning detection (monitoring) systems.

The largest compilation/depot of hazard, exposure and risk maps of the country is contained in the open-source renewable Geoportal of Natural Hazards and Risks of Georgia created by CENN and available at <http://drm.cenn.org/index.php/en/>. However, these maps date back to 2012 and are small-scale. As well, the majority of hazard maps kept by the NEA are of 1:100,000 and smaller scale, while 1:5,000 and 1:10,000 scale maps are what are actually needed.

A user-friendly electronic database on hydrometeorological and geological parameters and climate-induced natural hazards does not exist. The bulk of the information stored/archived at the NEA is in paper or in a user-unfriendly electronic format, readily unavailable. Much of the information which NGOs, academic and research institutions and development projects require for research, educational and development purposes is neither available online nor free-of-charge.

Concerning a national database on vulnerability/exposure and risks, the first efforts to create such database were made by the EMA. More specifically, the geoinformation portal Geonode-2.4-b22 was installed at the OC/MC of the EMA, allowing creation of thematic maps by developing various GIS layers and uploading/downloading spatial data to the portal. Currently, the EMA is subordinate to the EMS, which should further work on integration of digital hazard maps developed by the NEA, GIS land inventory data contained at the WMS of the NAPR and other spatial data stored with various national agencies and institutions at “Geonode2.4-b22”.

There is no single piece of legislation in Georgia governing flood assessment and management issues as required by the EUAA and the NEAP-3, including technical regulations on methodology for flood hazard mapping and risk assessment. Common practices of flood hazard mapping as carried out by the NEA do not necessarily follow EU methodologies and are done at macro-scale (as a result of which 1:100,000 and even smaller-scale so-called “susceptibility maps” are produced). The most comprehensive EU-compliant hazard, vulnerability and risk assessments exist for the Rioni River Basin developed under a UNDP-implemented project through financial support from the AF. The SDC also supported the NEA in hazard assessment and mapping for several settlements of Mestia municipality, based on a Swiss hazard mapping methodology. Currently, with assistance of the EU (PPRD project), a separate flood management legal act (technical regulation), based on the EU Flood Directive, is being developed through coordination of the Water Division of the Environmental and Climate Change Department, MoEPA, the NEA and the EMS. More specifically, the NEA is working on elaboration of the flood hazard methodology, while the EMS handles the vulnerability and risk assessment methodologies. It is expected the sub-law will be adopted by the end of 2018.

DRM/DRR financing. Financing of resilience actions as mentioned above is not sufficient and is mostly focused on response, recovery and rehabilitation. Thus there is a need to increase state budgetary allocations for such activities as afforestation/reforestation, natural regeneration of forests, restoration of floodplain forests, terraces and riverbanks by using bioengineering methods etc.

Local municipalities have very limited budgets for DRR, including reserve funds; most financing comes from the central budget, including the MRDI/MDF, primarily spent on disaster mitigation, recovery and rehabilitation measures and not on disaster risk prevention measures. Private investments in DRR is limited to the financing of some minor hydrometeorological and geological services through information user fees, as defined by the NEA.

The NEA's budget needs significant revision, in terms of increased obligations under international agreements. As well, work should be carried out to diversify and improve the NEA's climate and hydrometeorological services for additional revenue generation. The insurance business can also be engaged for climate-induced national hazards.

Donor financing in the DRM/DRR area is insufficient. Efforts should be intensified to attract donor assistance in the area of DRR/CCA, as well as relevant international funding mechanisms e.g. GCF funds.

Preparedness, including communities' resilience and awareness. There is no multi-hazard early warning system at national, regional and community levels, while the existing hydrometeorological and geological monitoring system is inappropriate/insufficient in terms on density of the network, continuity of measurements and parameters measured. Its components exist only for some hazards and at a limited scale (e.g., landslide EWS for Devdoraki Glacier, FFEWS for Rioni River Basin, debris flow detection system near Vardzia cultural monument). There are no community-based early warning systems in the country that ideally should be part of a nation-wide early warning system.

CCA/DRR measures implemented on-the-ground are more reactive than pro-active; for example, the construction/rehabilitation of riverbank protection structures, agriculture and storm-water drainage systems and rehabilitation of damaged infrastructure. Such measures as land use planning/zoning, application of climate-resistant designs, buildings and materials, restoration and maintenance of natural watersheds, wetlands, river buffer zones, floodplain forests, developing of agroforestry and using it for slope stabilization, afforestation/reforestation and natural forest regeneration are practiced only on a very limited scale.

Communities in Georgia have very limited/no knowledge on climate-induced natural hazards, vulnerabilities and risks and are not prepared in terms of proper response capacities (e.g., they do not have community preparedness and response plans, mapped evacuation routes, evacuation centres, local warning systems and response teams). Moreover, there is no common practice of implementing community-based multi-hazard risk management/reduction processes, where local communities plan and implement DRR/CRR initiatives such as watershed, floodplain and wetland restoration and slope stabilization measures using bioengineering (e.g. agroforestry) methods etc.

Public awareness on DRR is crucial for better preparedness for response and communities' resilience. In general, DRR awareness at both national and local levels is very low and there is a need for comprehensive education, awareness/public information campaigns and programmes targeting all levels of educational institutions, the media, rural communities, vulnerable groups including people living under the poverty line, IDPs, people with disabilities, the elderly, single mothers et al., and in particular decision-makers and the general public.

6.1 Capacity gaps and needs

Summarising the findings of this baseline study, the following conclusions and recommendations can be drawn:

CCA/DRR governance

▶ Reporting requirements under international conventions:

- *Georgia is obliged to submit its FNC to the UNFCCC, which is being currently elaborated. As previous experiences and lessons learned indicate, there is a need for setting up a QA/QC system for climate change predictions and vulnerability assessments.*
- *Georgia is obliged to submit online its Sendai Framework monitoring report as of March 2018 in relation to the Programme's targets and indicators. The data readiness report submitted in 2017 indicated the absence/shortage of data on major indicators to be reported. Thus, there is a need for developing DRR statistics, setting up a monitoring and reporting system and preparing annual online monitoring reports under the Sendai Framework.*

CCA/DRR Legal-regulatory framework:

- *Regardless of the presence of framework CCA/DRR laws, e.g. the Law on Civil Safety and the Law on Emergency Situations, they need significant updating to address legal gaps, e.g. establishing clear criteria for classification of disasters.*
- *Specific regulations stipulated from framework laws and legal gaps should be developed, including: i) methodologies on multi-hazard, vulnerability and risk assessments and mapping; ii) methodologies on flood assessment and mapping; iii) communication protocols for multi-hazard early warning systems; iv) regulation on developing emergency situation passports by municipalities; and v) SOPs of individual entities engaged in a unified emergency management system.*
- *CCA/DRR considerations are not well-integrated in land use zoning and planning, nor in building codes, and thus there is a need for such actions.*

CCA/DRR policy framework and planning platforms:

- *There is no national adaptation policy (NAP) framework nor a related inter-agency coordination mechanism in the country. Therefore, there is a need to develop such a policy framework and the establishment of an effective coordination mechanism.*
- *The existing INDC submitted to the UNFCCC secretariat as a requirement under the Paris Agreement is not detailed enough in terms of intended CCA commitments. Besides, the INDC should be transformed into an NDC as committed to by the country. Moreover, a multi-stakeholder committee should be created to coordinate the NDC process, as well as to ensure a strategic approach towards accessing GCF funds.*
- *Integration of adaptation considerations into development and sectoral strategies is limited and there is a need to make ef-*

forts towards developing adaptation strategies for priority sectors; e.g., hydropower, water resources management, drinking water supply, hydropower, irrigation and drainage, infrastructure development etc. Focal points at each relevant sectoral Ministry should be assigned and their awareness raised on CCA adaptation issues.

- Regardless of the existence of national Civil Safety and DRR policies, these documents are outdated and need updating and/or greater detail in terms of reflecting a new institutional setting (relevant to Civil Safety Strategy) and inclusion of hazard, vulnerability and risk assessments together with relevant hazard and risk maps (relevant to DRR Strategy). In order to ensure engagement of various stakeholders for their experts' opinion, an advisory strategic planning panel/commission should be created for DRR strategic planning purposes as prescribed by the Law on Civil Safety.
- Emergency risk management planning platforms, necessary for individual entities of a unified emergency management system (e.g. individual Ministries, municipal governments etc.), are significantly lacking. Thus, there is a need for developing such planning frameworks, including threat assessment documents, at the municipal level.

► **Institutional setting:**

- Inter-agency, government-donor and state and local governments' coordination mechanisms either do not exist or are inactive. Thus, they should be strengthened through establishing clear communication lines between all key actors and creating multi-stakeholder coordination/advisory bodies for both CCA and DRR; contact persons should be nominated in each Line Ministry for better integration of CCA into development and sectoral policies.
- There is a need for significant DRR capacity building in key/high-level institutions. For example, EMS, recently established through the merger of SSCMC and EMA, needs institutional and staff level capacity building in terms of optimum organizational structure, job descriptions, skills and qualifications of staff, procedures etc.
- There is a need for significant capacity building of local governments in: i) identification of climate-induced hazards, vulnerabilities and risks; ii) development of detailed instructions/methodologies at local level for CCA/DRR planning; iii) development of CCA/DRR and preparedness and response plans; iv) setting up local units for CCA/DRR and/or designating resilience officers from the staff of local municipalities; and v) accessing various international technical assistance funding mechanisms, e.g. Covenant of Mayors – Adapt, GCF, GEF etc.
- At municipal and community levels, a volunteers' system should be established and strengthened, including creation of a volunteers' registry, training centres and programmes and local volunteer groups.
- Emergency reserves should be developed at national, regional and local levels.

■ **Risk knowledge – hazard and risk monitoring, forecasting, hazard, vulnerability and risk assessment, database management and use of climate information**

- **Monitoring:** Hydrometric, agrometeorological and ground water monitoring is limited in terms of density, geographic distribution, number and type of parameters measured and continuity of measurements (continuous versus manual); comprehensive geological and topographic surveys in order to depict landslide inventory (isopleth) maps are not carried out frequently enough. The use of aerial photography is also limited in terms of extent and scale. Thus, there is a need for the expansion and upgrading of existing hydrometric, agrometeorological and ground water monitoring networks.
- **Forecasting:** Existing synoptic and hydrological forecasts are not precise enough in terms of spatial and temporal dimensions due to a lack of necessary real-time hydrometeorological data and equipment. Moreover, there are no modern, near-real-time fully-integrated forecasting platforms for other climate-induced hazards. Thus, there is a need for developing effective and reliable forecasting platforms for all climate-induced natural hazards.

► **Hazard assessment, mapping and database:**

- *There is no unified geographic information system in the country, including functional geoportal with relevant meta-databases and standard specifications for meta-databases.*
- *NEA, a responsible body for hydrometeorological and geological monitoring, climate-induced hazard assessment and mapping, does not keep any user-friendly standardized electronic database on hydrometeorological and geological parameters and climate-induced natural hazards; the bulk of the historical information stored/archived at NEA is in paper or in a user-unfriendly electronic format.*
- *NEA's geospatial meta-databases are not standardized and linked to the newly established geoportal.*
- *Hydrometeorological and geological information, which NGOs, academic and research institutions and development projects require for research, education and development purposes are not available free for charge.*
- *The largest compilation/depository on hazard, expose and risk maps in the country contained in the open-source renewable Geoportal of Natural Hazards and Risks of Georgia created by CENN is outdated and maps included there are of insufficient scale.*
- *NEA does not have hazard maps for all climate-induced hazards and for all major river basins. There is also a lack of large-scale (1:5,000 and 1:10,000) maps. Multi-hazard maps are also lacking within the NEA.*

Stemming from all of the above, there is a need for:

- *Establishing a unified geoportal, developing geospatial information standards, conforming existing meta-databases with such standards and linking them with the national geoportal;*
- *Developing larger-scale hazard maps for all climate-induced natural hazards and for major river basins;*
- *Establishing user-friendly electronic database(s) on hydrometeorological and geological parameters and climate-induced hazards within the NEA;*
- *Making monitoring and hazards data available for free for research and educational purposes; and*
- *Updating the natural hazards atlas.*

■ **Vulnerability and risk assessment, mapping and database**

- *There is no technical knowledge, capacity and readily available socio-economic data to conduct vulnerability and risk assessments;*
- *Vulnerability assessments and risk maps for all climate-induced natural hazards and for all major river basins do not exist;*
- *A national database on vulnerability/exposure and risks does not exist; and*
- *The geoinformation portal Geonode-2.4-b22 kept at the OC/MC of the EMA under EMS, does not have digital hazard maps developed by NEA, GIS land inventory data held at the Web Map Service (WMS) of the National Agency of Public Registry nor other spatial data stored with various national agencies and institutions.*

Thus, there is a need for:

- *Conducting vulnerability and risk assessments for all climate-induced hazards and for all major river basins; and*
- *Establishing a national user-friendly electronic database, based on the already existing Geonode-2.4-b22 on vulnerability/exposure and risks and linking it to the national geoportal and other metadatabases.*

► **Use of climate information:** There is no common practice in the country for applying climate information by various sectors and end users, including irrigation-drainage, hydropow-

er, roads/traffic management, insurance and agricultural sectors. Currently, these types of activities are limited with providing advice to farmers only on the use of pesticides, based on climate conditions. This is done by the NFA under the MoEPA. Thus, there is a need for developing climate information and advisory products and diversifying end users for them.

CCA/DRR financing

► State budget for DRR/resilience measures

- *The total amount spent on recovery and rehabilitation works annually is significant, but is still very small compared to annual average losses. Financing of resilience actions is mostly focused on response, recovery and rehabilitation. Therefore, there is a need to increase state budgetary allocations for such activities as afforestation-reforestation, natural regeneration of forests, restoration of floodplain forests, terraces and riverbanks by using bioengineering methods etc.*
- *A dire situation exists in terms of financing hydrometeorological and geological monitoring and forecasting services. The NEA's budget's dynamics, related to hydrometeorological and geological monitoring and forecasting, shows an alarming decreasing trend for 2017-2018 and the 2019 forecast that is related to removal of one of its largest source of financing (royalties from natural and mineral resources use licences). Thus, the NEA's budget needs significant revision in relation to its increased obligations under international agreements. In addition, work should be carried out to diversify and improve the NEA's climate and hydrometeorological services for additional revenue generation.*

► Local budgets for DRR/resilience measures: Local municipalities have very limited budgets for DRR. Most DRR/resilience measures are funded through the state budget, including the MDF and the Fund for the Implementation of Regional Projects (FIRP), and only for structural DRR measures and rehabilitation of damaged infrastructure. Thus, there is a need to increase local budgets for DRR and refocusing local financing on such activities, such as afforestation-reforestation, natural regeneration of forests, restoration of floodplain forests, terraces and riverbanks by using bioengineering methods, watershed and wetlands restoration, etc.

► Private investments: Private investment in DRR is limited to financing some minor hydromet and geological services through information user fees, as defined by the NEA. Thus, there is a need for diversifying climate advisory services and revenues received from them, including setting up flood and other natural hazard insurance systems.

► International Development Assistance: Donor assistance in CCA and in particular DRR is insufficient to compensate annual average losses from climate-induced natural disasters. Therefore, efforts should be intensified to attract more donor assistance in the area of DRR/CCA and as well, international funding mechanisms available more effectively, e.g. GCF funds.

Preparedness

- **MHEWS:** There is no multi-hazard early warning system at national, regional and community levels, while the existing hydrometeorological and geological monitoring system would not support establishment and operation of such systems in terms of density of network, continuity of measurements and parameters measured. Its elements exist only for some hazards and at a limited scale. Forecast, warning and communication, including last-mile communications are not precise or operational enough in terms of their spatial and temporal dimensions. There are no community-based early warning systems in the country that ideally should be part of a nation-wide early warning system. Thus, there is a need to establish a fully-integrated near-real-time Multi-Hazard Early Warning System, including effective warning and communications at national, municipal and community levels.

- ▶ **Implementation of CCA/DRR measures:** operational capacities, including knowledge and skills to implement CCA/DRR measures are weak all levels. Work towards research, development and diffusion of adaptation technologies is very limited. The focus is more on response and rehabilitation measures, rather than on preventive measures; e.g., the integration of climate/disaster risks in land use zoning and planning, building codes, application of climate-smart technologies and practices, drip and sprinkle irrigation, drought-resistant local landraces and endemic crops, bioengineering, including agroforestry methods for riverbank and slope stabilization etc. Thus, there is a need for knowledge and skills development towards application of preventive measures, as well as for implementation of demonstration disaster prevention projects.
- ▶ **Community-based Multi-Hazard Risk Management process:** Communities in Georgia have very limited/no knowledge on climate-induced natural hazards, vulnerabilities and risks, and are not prepared with proper response capacities. More specifically, they do not have community preparedness and response plans, mapped evacuation routes, evacuation centres, local warning systems nor a response team. Moreover, there is no common practice of implementing community-based multi-hazard risk management/reduction processes, where local communities plan and implement DRR/CRR initiatives; e.g., watershed, floodplain and wetland restoration and slope stabilization measures using bioengineering (e.g. agroforestry) methods etc. Thus, there is a need to introduce and implement participatory community-based Multi-Hazard Risk Management processes in vulnerable communities affected by climate-induced natural hazards.
- ▶ **Public awareness:** Public awareness on DRR is crucial for better preparedness for response and communities' resilience. In general, DRR awareness at both national and local levels is very low and there is a need for comprehensive education, awareness/public information campaigns and programmes targeting all levels of educational institutions, media, rural communities, vulnerable groups, including people living under the poverty line, IDPs, people with disabilities, the elderly, single mothers et al., decision-makers and the general public.

6.2 Recommended actions (road map) to address capacity gaps in the CCA/DRR area

This sub-chapter contains recommended actions for the period 2018-2023 to address gaps and meet needs in CCA/DRR, identified through baseline studies. It includes recommended actions with an indication of capacity gaps/needs, international obligations, national statutory and policy requirements, responsible parties, potential sources of financing/donor(s), approximate cost(s) and timeframe.

According to cost criteria, actions are divided into low (up to 100,000 USD), medium (100,000-1,000,000 USD) and high (above 1,000,000 USD) cost categories. According to timeframe, actions are divided into short-term (up to one year), mid-term (one to three years) and longer-term (three to five years) categories.

#	Action	Gap	International obligation	National statutory and policy requirement	Responsible party	Potential source financing/Donor	Cost	Time-frame	Comment
CCA/DRR governance – international obligations, national laws, policies, planning frameworks, institutional setting and capacities									
1.	a) Development of the 4th national communication b) Setting of QA/QC system for climate change vulnerability assessment	a) Absent 4th national communication b) Lack of a QA/QC system for climate change vulnerability assessment	UNFCCC- development and submission of National Communication	NEAP 3	MoEPA – Environment and Climate Change Department	UNDP/GEF	Small	Medium-term	Fourth national communication is being developed by MoEPA
2.	Development of the NDC, with a focus on CCA and submission of this document to UNFCCC secretariat	Absent NDC; poor quality of INDC in terms of CCA	UNFCCC/Paris agreement	NEAP 3	MoEPA – Environment and Climate Change Department	GoG; GCF	Medium	Medium-term	MoEPA is working on the development of project proposal for submission to GCF
3.	Setting up of a NDC multi-stakeholder/inter-agency commission	Lack of CCA policy coordination mechanism	UNFCCC/Paris agreement		MoEPA – Environment and Climate Change Department in cooperation with relevant Line Ministries	GoG; UNDP/GEF	Small	Short-term	MoEPA is working on the development of project proposal for submission to GCF
4.	Appointment of CCA focal points/contact persons in Line Ministries	Poor integration of CCA considerations into development and sectoral strategies; poor inter-agency cooperation	UNFCCC/Paris agreement; EUAA.		GoG	GoG	Small	Short-term	
5.	Setting up of national Sendai Platform and its strengthening	Lack of a national platform for the Sendai Framework	Sendai Framework	N/A	EMS in cooperation with relevant Line Ministries	GoG – EMS	Small	Short to medium term	Upcoming UNDP/SDC/GCF project: "Development of Multi-hazard early warning system and use of climate information in Georgia" (hereafter: UNDP/SDC/GCF MHEWS) plans assistance for improving cooperation mechanisms through GCF funding
6.	Setting up of national monitoring and reporting system for Sendai Framework – development and on-line submission of Sendai Framework Monitoring reports	Lack of national monitoring and reporting system for Sendai Framework	Sendai Framework	N/A	EMS in cooperation with relevant Line Ministries	GoG – EMS	Small	Short to medium term	

7.	Enactment of a new Law on Civil Safety	Existing Civil Safety Law needs significant revision in terms of new local needs and realities	Sendai Framework	Law of Georgia on Structure, Authority and Operational Procedures of the Government of Georgia; National DRR strategy	EMS, Parliament of Georgia	GoG	Small	Short-term	new Law on Civil Safety is adopted by the Parliament, needs Presidential signature and enactment
8.	Development of detailed criteria for dividing disasters into national and local disaster categories	Lack of clear criteria for dividing disasters into national and local-level disaster categories	Sendai Framework	Law of Georgia on Structure, Authority and Operational Procedures; Law on Emergency Situations; National DRR strategy	EMS, Parliament of Georgia	GoG; UNDP/SDC/GCF MHEWS project	Small	Short term	UNDP/SDC/GCF MHEWS plans to assist the GoG in revising existing legislation to fill legal gaps through SDC funding
9.	Development of technical guidance for local municipal governments on developing municipal level preparedness and response and DRR plans	Lack of standardized methodology, including template for municipal level preparedness and response and DRR plans/emergency and risk management plans	Sendai Framework	Law of Georgia on Structure, Authority and Operational Procedures; National DRR strategy	EMS; SDC component project of UNDP/CSD/GCF MHEWS project	UNDP/CSD/GCF MHEWS project	Small	Short term	RDFG with assistance of USAID project: "Zrda activity" in Georgia assists around 10 municipalities in developing detailed instructions and templates for emergency preparedness and response plans Upcoming UNDP/SDC/GCF MHEWS plans to assist 10 municipalities in developing preparedness and response plans through SDC funding
10.	Development of technical regulation: methodology on multi-hazard assessment and mapping	Lack of multi-hazard assessment and mapping methodology	Sendai Framework	NEAP 3	NEA	GoG; UNDP/SDC/GCF MHEWS project	Small	Medium-term	Upcoming UNDP/SDC/GCF MHEWS plans to address this need through SDC funding
11.	Development of flood assessment and mapping methodology in line with EU flood directive	Lack of EU standard-based flood assessment and mapping methodology	EUAA, INDC	NEAP 3	NEA	GoG; EU PPRD-2	Small	Short- to medium term	Currently, PPRD-2 project provides assistance to NEA in developing EU-compliant flood assessment and mapping methodology; UNDP/SDC/GCF MHEWS plans to review existing methodologies and update if necessary.
12.	Development of technical regulation: methodology on multi-hazard gender-sensitive vulnerability and risk assessments	Lack of multi-hazard vulnerability and risk assessment methodology	INDC; Sendai Framework	NEAP 3; National DRR Strategy	EMS	GoG; UNDP Governance Reform Fund (GRF) project	Small	Short to medium term	Currently, UNDP GRF project assists EMS in developing disaster damage and loss assessment methodology. UNDP/SDC/GCF MHEWS plans to review existing methodologies and update if necessary through GCF funding.
13.	Development of MHEWS national protocol	Lack of MHEWS national protocol	INDC; Sendai Framework	Law on Civil Safety; Law on Emergency Situations NEAP 3; National DRR strategy	EMS in cooperation with NEA, MIA and other Line Ministries	GoG; UNDP/SDC/GCF MHEWS project	Small	Medium-term	UNDP/SDC/GCF MHEWS project plans to address this gap through SDC funding

14.	Development of SoPs for EMS, NEA, MIA and other important government entities engaged in DRR and in particular MHEWS	Lack of detailed SoPs for EMS, NEA, MIA and other important government entities engaged in DRR and in particular MHEWS	UNFCCC/Paris agreement/INDC; Sendai Framework.	Law on Civil Safety; Law on Emergency Situations; National DRR strategy	Various Line Ministries	GoG; UNDP/SDC/GCF MHEWS project	Small	Medium-term	UNDP/SDC/GCF MHEWS project plans to address this gap through SDC funding
15.	Development and adoption of regulation on land use zoning/ planning, taking into consideration CRM/DRR	Lack of land use zoning policy, incorporating CRM/DRR considerations	UNFCCC/Paris agreement/INDC; Sendai Framework.	National DRR strategy	GoG; UNDP/SDC/GCF MHEWS project	UNDP/SDC/GCF MHEWS project	Small	Medium-term	UNDP/SDC/GCF MHEWS project plans to assist the GoG in adopting land use zoning, incorporating CCA/DRR considerations funded by GCF
16.	Revision of spatial planning legislation to incorporate CRM/DRR considerations, e.g. hazard assessment and mapping	Lack of spatial planning and urban development legislation, incorporating CRM/DRR considerations, e.g. hazard assessment and mapping	UNFCCC/Paris agreement/INDC; Sendai Framework.	National DRR Strategy	GoG	GoG; donors: EU, UNDP/GCF, WB, EBRD, etc.	Small	Medium-term	
17.	Revision of existing building code to reflect CRM/DRR considerations	Existing building code does not incorporate CRM/DRR considerations	UNFCCC/Paris agreement/INDC; Sendai Framework.	National DRR Strategy	GoG	GoG; donors: EU, UNDP/GCF, WB, EBRD, etc.	Small	Medium-term	
18.	Setting and strengthening of government-led HCT – information sharing/coordination centre	Absent government-led HCT – information sharing/coordination centre	Sendai Framework	National DRR strategy	EMS in cooperation with relevant Line Ministries, donors and NGOs		Small	Short to medium term	
19.	Setting and strengthening of advisory body for developing national DRR, emergency and risk management planning frameworks	Advisory body for developing national DRR, emergency and risk management planning frameworks	Sendai Framework	Law on Civil Safety; Law on Emergency Situations National DRR strategy	EMS in cooperation with relevant Line Ministries, donors and NGOs	GoG-EMS; UNDP/SDC/GCF MHEWS project	Small	Short to medium term	
20.	Development of NAP	Absent NAP	UNFCCC/Paris agreement/INDC; EUAA.	MoEPA's statute NEAP 3	MoEPA – Environment and Climate Change Division in cooperation with relevant Line Ministries	GoG; UNEP/GCF	Medium	Medium-term	MoEPA is being preparing a proposal on NAP for submission to GCF
21.	Carrying out vulnerability studies for various important sectors and ecosystems and development of relevant sectoral CCA strategies, (e.g. Adaptation Plans for tourism, water resources management, drinking water supply, hydro-power, infrastructure, Black Sea coast	Lack of vulnerability assessments for various important sectors and relevant sectoral adaptation strategies; present agriculture adaptation plan; present vulnerability studies and adaptation	UNFCCC/Paris agreement/INDC; EUAA.	MoEPA's statute NEAP 3	MoEPA – Environment and Climate Change Division in cooperation with relevant Line Ministries	GoG; UNDP/GEF; GIZ	Medium	Longer-term	These gaps are partially being addressed by on-going UNDP/GEF project aiming at developing the FNC and the Second Biennial report (BUR)

22.	Revision of existing Civil Safety Plan/Development of new Civil Safety Plan	Present outdated Civil Safety Plan, not reflecting new institutional setting	Sendai Framework	National Law on Emergency Situations; Law on Civil Safety; National DRR strategy	EMS in cooperation with other Line Ministries	GoG	Small	Medium-term	
23.	Development of Emergency Management and Risk Management Plans by individual entities of unified Emergency Management System	Lack of Emergency Management and Risk Management Plans by individual entities of unified Emergency Management System	Sendai Framework	National Law on Emergency Situations; Law on Civil Safety; National DRR strategy	Line Ministries; Local Self-Governments; EMS; NEA; UNDP/SDC/GCF MHEWS project	GoG; USAID Zrida Activity in Georgia - RDFG UNDP/SDC/GCF MHEWS project	High	Longer-term	RDFG assists around 10 municipalities in developing emergency preparedness and response plans UNDP/SDC/GCF MHEWS project plans to assist around 10-20 local governments, including Tbilisi City Hall in developing preparedness and response plans. Moreover, it will help GoG develop multi-hazard risk reduction plans for 11 major river basins.
24.	Development of municipal level CCA plans	Lack of municipal level CCA plans	UNFCCC/Paris agreement/INDC		LGs	LG budgets; Covenant of Mayors-Adaptation; EU, USAID, Giz, etc.	Medium	Medium-term	
25.	Detailed capacity needs assessment of existing institutions engaged in DRR, including EWS; development of capacity building training programme and implementation of this programme	Present poor DRR capacities of state and local governments in DRR, including preparedness, response, recovery and rehabilitation	Sendai Framework	National DRR strategy	GoG; UNDP/SDC/GCF MHEWS project in cooperation with Line Ministries and Local Governments.	GoG; UNDP/SDC/GCF MHEWS project.	High	Longer-term	UNDP/SDC/GCF MHEWS project plans to carry out capacity needs assessment of institutions engaged in multi-hazard mapping, risk assessment and EWS, develop and implement a capacity building/training programme funded by SDC
Risk knowledge: monitoring, hazard assessment and mapping, database management, use of information									
26.	Expansion and upgrade of hydrometeorological, geological and agro-meteorological monitoring networks	Presence of severely reduced, outdated and under-representative (in terms of spatial and temporal coverage) hydrometric monitoring network; presence of limited scale monitoring of geodynamic processes; current sparse agrometeorological networks	Sendai Framework; UNFCCC/Paris agreement/INDC	Law on Atmospheric Air Protection; Statute of NEA; BDD; NEAP 3; National DRR Strategy	GoG; UNDP/SDC/GCF MHEWS project	GoG; UNDP/SDC/GCF MHEWS project; Various donors/donor projects: EU, Finish government, etc.	High	Longer-term	Upcoming UNDP/SDC/GCF MHEWS project plans to assist GoG in expansion and upgrade of hydrometeorological, geological and agro-meteorological monitoring networks funded by GCF

27.	Development of groundwater monitoring network to cover all groundwater basins	Presence of sparse groundwater monitoring network	UNFCCC/Paris agreement/INDC	Law on Atmospheric Air Protection; Statute of NEA; NEAP 3; National DRR Strategy	GoG	GoG; Various donors/donor projects; EU, Finnish government, etc.	Medium	Longer-term	
28.	Expansion of regional radar network (addition of three radars in West Georgia) and integration of its data into weather forecasting and modelling platforms	Lack of regional radars	UNFCCC/Paris agreement/INDC; Sendai Framework	Law on Atmospheric Air Protection; Statute of NEA; NEAP 3; National DRR Strategy	GoG – National Aviation Service, NEA	GoG, US government	High	Medium-term	One radar will be purchased through financial assistance of US government and will be installed at Kutaisi International Airport; a second radar will be purchased by the National Aviation Service and installed in Poti
29.	Expansion of ground-based lightning detection (monitoring) network (six detectors) and in combination with radar data integration of its data into weather forecasting and modelling platforms	Underdeveloped ground-based lightning detection monitoring network	UNFCCC/Paris agreement/INDC; Sendai Framework	Law on Atmospheric Air Protection; Statute of NEA; NEAP 3; National DRR Strategy	GoG - NEA	GoG, various donors: US government, UNDP/SDC/GCF MHEWS project, etc.	Medium	Medium-term	Four detectors have already been installed and integrated into existing weather forecasting system. There is a need for adding at least four other detectors to the system
30.	Undertaking of relevant technical studies to model and map all relevant climate-induced natural hazards including glaciers' retreat for Georgia, to provide a single source of definitive hazard mapping of the appropriate technical specification and level of detail for all uses	Lack of definitive and technically appropriate climate-induced hazard maps; Limited knowledge and implementation of modern hazard modelling tools; Lack of key data sets for development of flood hazard models, due to cost (e.g. Digital Elevation Models of the floodplain); and due to lack of systematic data collection capabilities within relevant government agencies	Sendai Framework; UNFCCC/Paris agreement/INDC; EUAA (relevant for flood assessment and mapping)	Law on Atmospheric Air Protection; Statute of NEA; Law on Emergency Situations; BDD; NEAP 3; National DRR Strategy	GoG-NEA; SDC component project of UNDP/SDC/GCF MHEWS project.	GoG; SDC component project of UNDP/SDC/GCF MHEWS project.	High	Longer-term	SDC component project of UNDP/SDC/GCF MHEWS project plans to assist NEA in climate-induced multi-hazard mapping and risk assessment for 11 major river basins funded by SDC

31.	Setting of fully integrated near-real-time forecasting platforms for all climate-induced major natural hazards occurring in Georgia within all major river basins as well as within smaller watersheds with high multi-hazard risks	Existing synoptic and hydrological forecasts are not precise enough in terms of spatial and temporal dimensions due to lack of necessary real-time hydrometeorological data and equipment. The most advanced near-real-time forecasting system exists only for floods within the Rioni River Basin. Moreover, there are no modern, near-real-time fully-integrated forecasting platforms for other climate-induced hazards. Thus, there is a need for developing effective and reliable forecasting platforms for all climate-induced natural hazards	Sendai Framework; EUAA; UNFCCC/Paris agreement/INDC.	Law on Atmospheric Air Protection; Law on Emergency Management; Law on Civil Safety; NEAP 3; National DRR Strategy	MoEPA-NEA	GoG; UNDP/SDC/GCF MHEWS project; Various	High	Longer-term	UNDP/SDC/GCF MHEWS project plans to assist NEA in creating, upscaling and/or replicating the Rioni flood forecasting model in other major river basins and for other climate-induced hazards, funded by GCF
32.	Carrying out gender-sensitive Socio-Economic Vulnerability Assessment and development of GIS-based risk maps	Socio-economic information required to assess climate induced hazard damages, losses, exposure and vulnerability is not currently available and is not collected systematically	Sendai Framework; UNFCCC/Paris agreement/INDC.	NEAP 3; National DRR Strategy	GoG – EMS; UNDP/SDC/GCF MHEWS project	GoG; UNDP/SDC/GCF MHEWS project	High	Longer-term	UNDP/SDC/GCF MHEWS project plans to assist GoG in conducting vulnerability and risk assessment and mapping for 11 major basins, through GCF funding for vulnerability assessment and SDC funding for multi-hazard risk assessment
32.	Creation of a unified geospatial information system in the country	Lack of a geospatial information management system compliant with the EU's INSPIRE Directive	EUAA	Government resolution on creation of a national commission on implementation of EU INSPIRE Directive	GoG - NAPR	Sida	Medium	Medium-term	Sida supported project on creating national geo-spatial information system in the country assists NAPR in developing a national Geo-spatial portal and standard specs. on geospatial information and meta-databases
33.	a) Updating of existing Open-source Geoportal on Natural Hazards and Risks b) Creation of a user- friendly electronic hydrometeorological and geological database within NEA c) Integration of the hydrometeorological metadatabase into the geospatial national information system compatible with EU geospatial information management system/data-portal	a) Outdated existing Open-source Geoportal on Natural Hazards and Risks b) Lack of a user- friendly electronic hydrometeorological and geological hazard database within NEA c) Non-integration of NEA's metadatabase into a unified geospatial data portal	Sendai Framework; UNFCCC/Paris agreement/INDC; EUAA	Law on Atmospheric Air Protection; NEA's statute; NEAP 3; National DRR Strategy	MoEPA-NEA	GoG; UNDP/SDC/GCF MHEWS project	Medium	Longer-term	Upcoming UNDP/SDC/GCF MHEWS project plans to assist NEA in creating a user-friendly electronic database on natural hazards and hydrometeorological and geological monitoring results, funded by GCF

34.	Creation of a user-friendly electronic database on groundwater monitoring	Lack of an electronic database on groundwater monitoring	UNFCCC	Law on Atmospheric Air Protection; NEA's statute;	MoEPA-NEA	GoG; Donors: EU, Finnish Government, etc.	Medium	Medium-term	
35.	Creation of a renewable user-friendly disaster vulnerability and risk database and national e-library	Lack of a renewable user-friendly disaster vulnerability and risk database and national e-library	Sendai Framework; UNFCCC/Paris agreement/INDC; EUAA.	Law on Emergency Situations; Law on Civil Safety; NEAP 3; National DRR Strategy	GoG - EMS	GoG; UNDP/SCD/GCF MHEWS project	Medium	Medium-term	UNDP/SCD/GCF MHEWS project plans to help EMS establish a renewable user-friendly disaster vulnerability and risk database and national e-library, funded through GCF
36.	Development of various user-oriented climate information and advisory products, e.g. agrometeorological calendars, irrigation-drainage advisories, flood insurance schemes and engagement of private sector in application of such products, etc.	Limited use of climate information; absent climate advisory products	Sendai Framework; UNFCCC/Paris agreement/INDC.	National Agriculture Strategy; Statutes of NEA and NFA; National DRR Strategy	MoEPA – NEA, NFA, Agriculture Scientific-Research Centre	GoG; UNDP/SCD/GCF MHEWS project	Medium	Medium-term	UNDP/SCD/GCF MHEWS project plans to help NEA and NFA develop climate information and advisory products and engage private sector in it, funded through GCF
CCA/DRR financing									
37.	<p>a) Application of a strategic approach when allocating state funds for CCA/DRR – refocusing from response and rehabilitation as well as hard structural measures to preventive measures – use of integrated natural resources management approaches, bioengineering methods, including agroforestry, climate-smart agriculture technologies and practices, floodplain zoning, etc.</p> <p>b) Increase in state budget allocations for CCA/DRR</p>	<p>Annual state allocation for CCA/DRR measures is insufficient to cover annual average damage from various climate-induced natural disasters and is focused on implementation of hard structural measures, response and rehabilitation as well as on compensation to affected population;</p> <p>Insufficient capital and operational costs for hydrometric and geologic monitoring</p>	Sendai framework; UNFCCC/INDC	Law of Georgia on Structure, Authority and Operational Procedures of the GoG; State Budget of Georgia; BDD.	Sectoral Ministries and Agencies – MRDI, MoEPA, MoE-PA-NEA MoESD; Ministry of Finance; Prime Minister's Office – EMS.	State Budget	High	Long-term	

38.	a) Revision of NEA's current funding modality to allow for retaining some portion of revenues from licensing of mining activities for the development of the geology sector	Insufficient capital and operational costs for hydrometric and geologic monitoring; NEA's budget's dynamics, related to hydrometeorological and geological monitoring, forecasting shows an alarming decreasing trend for 2017-2018 and 2019 forecast that is related to removal of one largest sources of financing from NEA (royalties from natural and mineral resources use licences)	Sendai framework; INDC	Law of Georgia on Structure, Authority and Operational Procedures of the Government of Georgia; State Budget of Georgia; BDD; NEA budget	MoEPA-NEA, UNDP/SDC/GCF MHEWS	State Budget; UNDP/SDC/GCF MHEWS Project; Private Sector	High	Longer-term	Upcoming UNDP/SDC/GCF MHEWS Project will partially address funding gap in hydrometeorological monitoring and forecasting by providing 28 million USD worth of services and goods for establishing multi-hazard early warning systems in the country. In addition, it will work with NEA to ensure its financial sustainability through developing a financial sustainability plan and improving and diversifying its services, funded through GCF
	b) developing a financial sustainability plan for NEA								
	c) diversifying NEA's revenue sources through developing new climate products and engaging the private sector								
39.	a) Applying a strategic approach to CCA/DRR donor funding through cost-benefit analysis and prioritization of fundable CCA/DRR measures/projects	Lack of donor financing for CCA/DRR; present non-strategic approach towards donor funding	Sendai Framework; INDC		GoG; UNDP/GEF project on Fourth National Communications and Second Biennial Update Report	State budget; GCF; UNDP/GEF project on Fourth National Communications and Second Biennial Update Report	Low	Longer-term	Presently, GCF supports strengthening of capacities of National Designated Authority; GiZ assists the MoEPA in developing project pipeline(s) for submission to GCF; Under planned NAP project, CCA actions/project ideas will be developed and prioritized based on CBA
	b) Development of pipeline of projects fundable from various donor sources								
	c) Enhancing resource mobilization from GEF and GCF								
40.	a) Applying a strategic approach towards CCA/DRR spending of local municipalities through developing CCA and DRR plans and prioritizing them by conducting cost-benefit and environmental impact assessments	Local CCA/DRR budgets are extremely low and only focused on hard structural measures	Sendai Framework; UNFCCC/INDC	Statutes and budgets of local governments; BDD	Local governments; Ministry of Finance.	Equalizing state budget transfers; local budgets	Medium	Longer-term	
	b) Increasing budgetary allocations by local governments in support of CCA/DRR								
41.	Creating solid financial reserves for disaster response and rehabilitation at all levels	Insufficient financial reserves for disaster response and rehabilitation	Sendai Framework; UNFCCC/INDC	Law on Civil Safety; National DRR Strategy	PM's office, President's administration; Line Ministries; Local governments.	Central budget; State reserve fund; Local reserve funds	High	Long-term	

Preparedness: MHEWS, implementation of CCA/DRR measures, Community-based Multi-Hazard Risk Management Process, Awareness and Education							
42.	<p>Establishment of fully-integrated near-real-time MHEWS within major river basins, within smaller watersheds with high multi-hazard risks, along critical infrastructure, e.g. road infrastructure and historical and cultural heritage sites</p> <p>b) Establish community-based MHEWS in most vulnerable communities</p>	<p>There is no real-time multi-hazard early warning system at national, regional and community levels, but only for some hazards and at a limited scale. Thus, forecast, warning and communication, including last-mile communication are not precise and operative enough in terms spatial and temporal dimension. There are no community-based early warning systems in the country that ideally should be part of a nation-wide early warning system</p>	Sendai Framework; UNFCCC/INDC; EUAA	Law on Civil Safety; Law on Emergency Situations; NEAP 3; National DRR Strategy	MoEPA - NEA; UNDP/SDC/GCF MHEWS project	MoEPA - NEA; UNDP/SDC/GCF MHEWS project; state budget; WB and other donors	High
							Long-term
							Upcoming UNDP/SDC/GCF MHEWS project plans to assist NEA, EMS, local governments in establishing fully-integrated near-real-time MHEWS country-wide, as well as in around 100 most vulnerable communities in establishing community-based MHEWS, funded through GCF
43.	<p>a) Building government and community knowledge and skills in application of pro-active climate-induced risk prevention measures</p> <p>b) Implementation of DRR and/or disaster prevention demonstration projects in areas with high disaster risk</p>	<p>Operational capacities, including knowledge and skills to implement CCA/DRR measures are weak all levels. The work towards research, development and diffusion of adaptation technologies is very limited. The focus is more on response and rehabilitation measures, rather than on preventive measures, e.g. integration of climate/disaster risks in land use zoning and planning, building codes, application of climate-smart technologies and practices, e.g. drip and sprinkle irrigation, drought-resistant local landraces and endemic crops, bioengineering, including agroforestry methods for river bank and slope stabilization, etc. Thus, there is a need for knowledge and skills development in application of preventive measures, as well as for implementation of demonstration disaster prevention projects</p>	Sendai Framework; INDC; EUAA	National Strategy on Environmental Education (draft); National DRR Strategy	<p>a) MoEPA-EIEC; UNDP/SDC/GCF MHEWS project</p> <p>b) MRDI; UNDP/SDC/GCF MHEWS project</p>	<p>a) MoEPA-EIEC; UNDP/SDC/GCF MHEWS project</p> <p>b) State Budget; MRDI's budget; UNDP/SDC/GCF MHEWS project</p>	High
							Longer-term
							Upcoming UNDP/SDC/GCF MHEWS project plans to assist around 100 vulnerable communities and decision-makers in building knowledge and skills in application of pro-active climate-induced risk prevention measures through implementing community-level DRR/resilience and large-scale structural DRR measures, funded through GCF

44.	Introducing and implementing participatory community-based Multi-Hazard Risk Management processes in vulnerable communities affected by climate-induced natural hazards	Communities in Georgia have very limited/no knowledge on climate-induced natural hazards, vulnerabilities and risks, and are not prepared in terms of proper response capacities. More specifically, they do not have community preparedness and response plans, mapped evacuation routes, evacuation centres, local warning systems or response teams. Moreover, there is no common practice of implementing community-based multi-hazard risk management/reduction processes, where local communities plan and implement DRR/CRR initiatives, e.g. watershed, floodplain and wetland restoration and slope stabilization measures using bioengineering methods, etc.	Sendai Framework: UN-FCCC/Paris agreement/INDC.		UNDP/SDC/GCF MHEWS project - A consortium of international and national NGOs to be hired under the project	UNDP/SDC/GCF MHEWS project	High	Longer-term	Upcoming UNDP/SDC/GCF MHEWS project plans introduce participatory community-based Multi-Hazard Risk Management processes, including implementation of on-the-ground community resilience measures in around 60-100 most vulnerable communities affected by climate-induced natural hazards, funded through GCF
45.	Development and implementation of nation-wide awareness/public information and education programmes at national, regional and local levels	Low CCA/DRR awareness at both national and local levels; Need for comprehensive education, awareness/public information campaigns and programmes targeting all levels of educational institutions, media, rural communities, vulnerable groups, including people living under the poverty line, IDPs, people with disabilities, the elderly, single mothers et al., the decision-makers and the general public.	Sendai Framework, UN-FCCC/INDC	National Strategy on Environmental Education (draft); National DRR strategy; NEAP-3	MoEPA – EIEC in cooperation with the Ministry of Education and Science, EMS, national and local NGOs, media, etc.	MoEPA-EIEC; EMS, MES, State Budget; UNDP/SDC/GCF MHEWS project	High	Longer-term	UNDP/SDC/GCF MHEWS project will assist EIEC in developing and implementing CCA/DRR awareness and education programmes at all levels, funded through GCF

Table 7. Recommended actions (road map) to meet Capacity Needs in CCA/DRR Area

