



GI:DRM

Global Initiative on
Disaster Risk Management

Report on Municipal trainings on analysing datasets and technical studies (“MTA-DS”)

Summary of conducted trainings on examining information regarding geological hazards and the geological segment of construction projects

Table of Contents

Introduction.....	3
Training topics	5
Attendees and venue of training.....	8
Feedback received from participants.....	9
Lessons Learned	13
Recommendations for future steps	13
Photos of trainings	15

Introduction

Georgia is one of the most distinct regions among mountainous countries compared to the scale of development of geological processes (landslides, debris/mudflows, rock avalanches, rockfalls, etc.), their reoccurrence, and negative results. All landscape-geomorphological zones are damaged by natural processes of different complexity, beginning from the Black Sea shore, and ending with the high mountainous Greater Caucasus Ridge. At the same time, the territory of the country is entirely within the range of 7-9 magnitude earthquakes, which directly affects the stimulation and provocation of landslides and rock avalanches. According to the data from Georgia's National Environmental Agency (NEA), 20% of settlements are in high-risk areas for geological processes, 24% are in medium, 19% are in low, and 37% are in very low-risk areas.

Based on the mentioned circumstances, it is crucial to take into account geological conditions of a local area when creating a development plan and implementing infrastructural or agricultural activities. In Georgia, the LEPL National Environmental Agency of the Ministry of Environment Protection and Agriculture (MEPAO) is the only state structure that deals with identifying, researching, and managing natural geological events. The NEA's geology department conducts regular monitoring in settlement areas twice a year (in spring and autumn) throughout Georgia.

Each year, NEA publishes the annual **Informational Geological Bulletin**, which reflects the information obtained as a result of mentioned geological monitoring and studies conducted during the period of extreme activation of the geological disaster. The bulletin contains information on the spread of processes in settlements and infrastructural objects within the monitored research area, along with the negative consequences they cause and the necessary preventive measures. This bulletin is distributed to all municipalities, state representative administrations in regions, and other interested institutions.

Aside from what was already mentioned, NEA's geology department undertakes immensely challenging tasks in Georgia, which is evaluating families or households situated in geological hazard zones and producing geological findings (visual engineering-geological reports) for them. These reports contain suggestions for preventing damage to homestead plots and residential buildings and are used to relocate families to stable geological areas. Regrettably, the number of relocated families has risen in the last few years (as shown in **Fig. 1**). Additionally, these families are classified as eco-migrants. The visual engineering-geological reports are sent to the municipality city halls and the LEPL Internally Displaced Persons, Ecomigrants, and Livelihoods Provision Agency for further action.

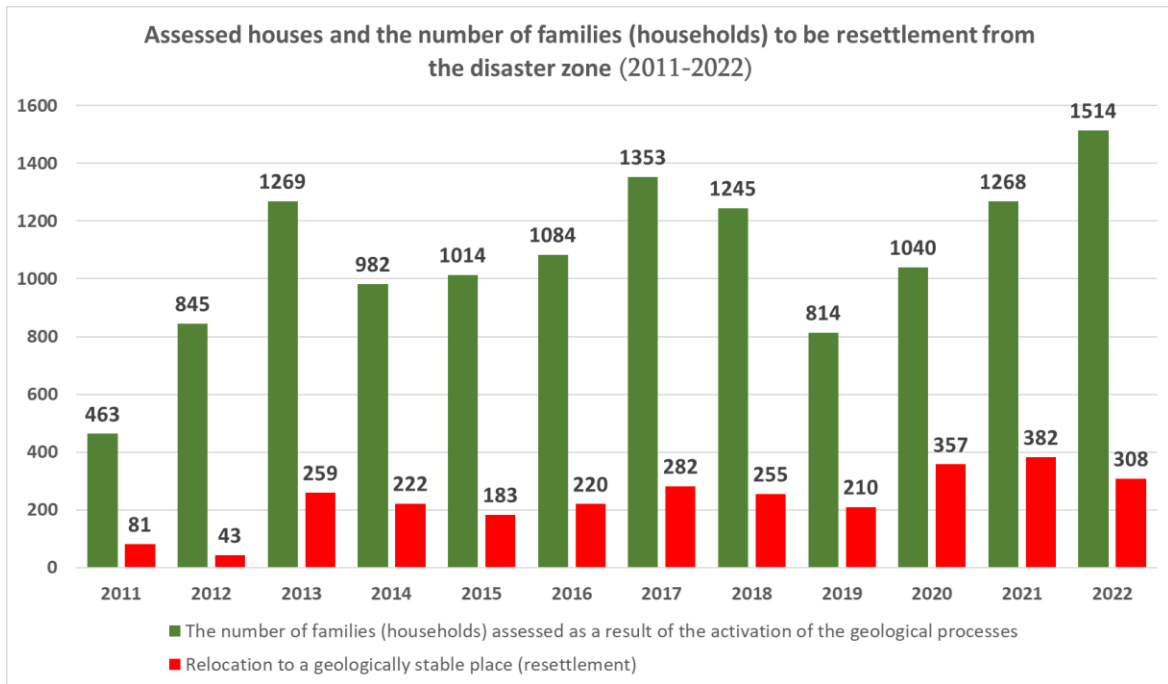


Fig. 1

Thus, municipality city halls gather a vast amount of information, particularly from the Geology Department of NEA. It's important to note that municipalities and state representative administrations in regions do not have geologists in their workforce, which makes it challenging to analyze geological data in certain cases. As a result, municipalities require further consultation, which slows down the decision-making process.

The purpose of current trainings was to provide support and improve the knowledge and skills of municipal staff in Georgia regarding geological documents they receive annually. The training was organized by the **Global Initiative on Disaster Risk Management (GIDRM)** team and was conducted for 11 regions of Georgia, including Tbilisi city, from June 29 to August 11 2023. The trainers were Mr. Merab Gaprindashvili, the Head of the Geology Department, and Mr. Otar Kurtsikidze, the Deputy Head of the Geology Department, who were invited from NEA.

Training topics

The first stage of activities was to prepare training materials focused on practical data for relevant municipal employees. The information gathered from this perspective includes the following: 1. Geological reports on households and infrastructure in each municipality. 2. An Excel and GIS database comprising families evaluated in the geological disaster zone all over Georgia. 3. Documents of valid construction regulations and standards in Georgia, such as "Foundations of Buildings and Structures," "Government Resolution on the Conditions and Rules for Issuing Construction Permits and Building Commissioning," "Spatial Planning Law of Georgia," "Earthquake-Resistant Construction." etc. 4. An annual informational geological bulletin "**The results of the development of natural geological processes in Georgia in 2022 and forecast for 2023**". 5. Geological hazard inventory maps for municipalities and regions, which are categorized by settlements. 6. A relevant bibliography of geological hazards assessment and engineering geology.

The main topics were divided into 3 presentations: 1. Geological activities in Georgia; 2. Review of the annual informational geological bulletin by regions; 3. Natural catastrophic events of the last decade in Georgia. During the training's introductory session, the topic of discussion focused on geology and its major fields, including mineralogy-petrology, paleontology, geomorphology, speleology, hydrogeology, and dynamic geology, which involves the study of modern geological processes. Additionally, a brief overview was given on the mineral resources of Georgia and their distribution throughout the country. The primary goals were to provide insight into identifying geological hazards, such as landslides, mudflows, rockfall/rock avalanches, and river bank erosion, in the municipalities, the level of their activation, the damage they can cause, and appropriate preventive measures to reduce the risks they pose.

During the presentations, the major factors that trigger geological disasters were discussed. Those factors are the lithological composition of rocks in a particular area, relief (slope inclination); variation of groundwater levels; climate; seismic conditions, and anthropogenic impact on the environment. The identification of triggering factors for disasters is one of the significant aspects of hazard assessment.

One of the main subjects of interest for participants was geological findings, that were prepared by NEA, for citizen's houses, homestead plots, and infrastructure facilities. Those reports are based on:

- Written appeal to NEA from the municipality mayor's office and other interested institutions;
- A written appeal to citizens who are living in hazard zones;
- Responding to a message received from the "hotline";
- Extreme activation of geological disaster (force-major).

Training participants were given a detailed explanation of the evaluation criteria for families needing resettlement to a geologically stable area. From this point of view, attention focused on the following features:

- Distance from the landslide active zone to the residential house;
- Distance from mudflow river/ravine floodplain or river-bed zone to the residential house;
- Distance from the area of active river-bank erosion to the residential house;
- The dynamic state of the geological process (high, medium, low) and its expected development;
- Degree of homestead damage by disaster process;
- The degree of deformation of the load-bearing structures of the building.

During the training, participants learned about instrumental geological monitoring in areas prone to landslides. In 2014, Georgia began installing modern monitoring systems for landslides. It is especially noteworthy an ongoing international project – “SCALING-UP MULTI-HAZARD EARLY WARNING SYSTEM AND THE USE OF CLIMATE INFORMATION IN GEORGIA”, financed by GCF and UNDP, within which landslide monitoring systems were installed in 11 locations, in the different regions of Georgia in 2022-2023 (Fig. 2). During the session, the attendees were briefed on how to obtain data from the monitoring systems that have been set up and how to keep the equipment in good condition. It was emphasized that the consistent operation of these systems is crucial not only for research purposes but also for ensuring the safety of communities over a prolonged period.

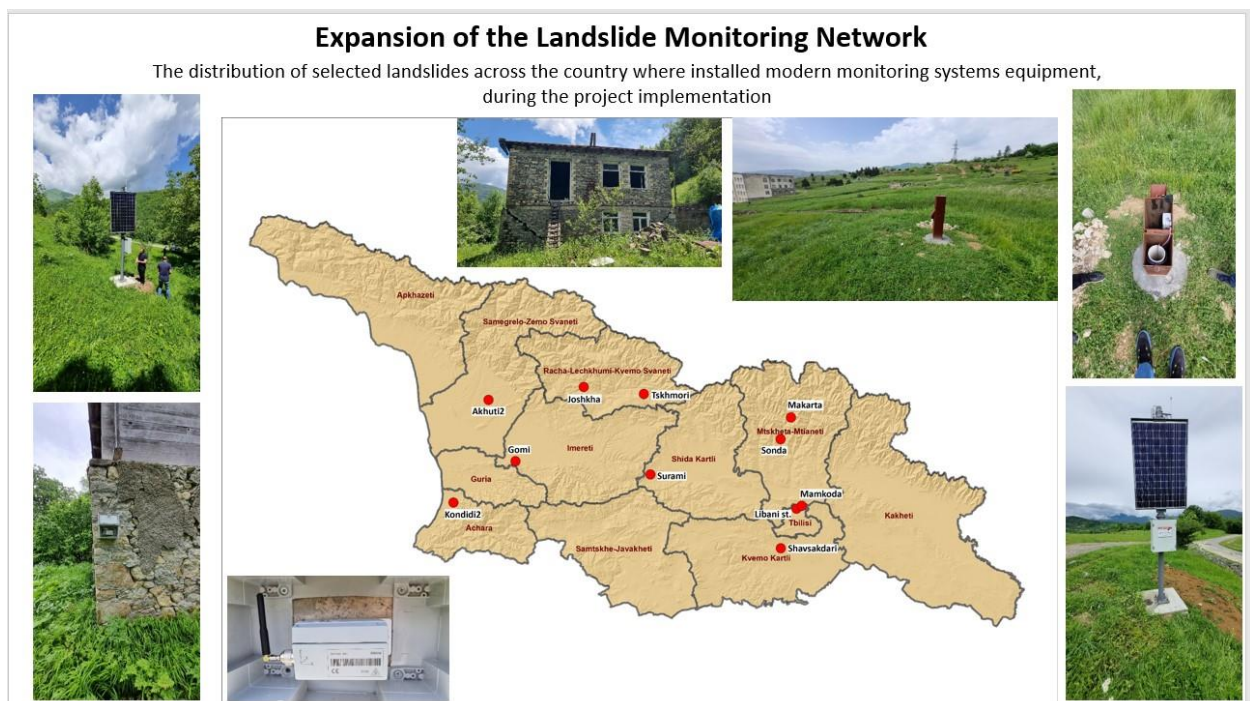


Fig. 2

A significant part of the presentations was to review engineering-geological surveys for construction. Considering that all infrastructure projects align with the architectural services of the municipalities, it was very important and useful for them to introduce geological investigations

related to construction. Engineering geological survey is an essential part of any kind of construction project, and therefore, it is necessary to know the major requirements of the geological part, which is defined by valid construction norms and rules. For example: the quantity and parameters of boreholes and trial pits for the construction of residential buildings, highways, tunnels bridges, etc.; laboratory research for samples of soil and groundwater; the structure of the engineering-geological survey report, and so on.

The water supply is the very actual subject of the populated areas in regions. Therefore, getting to know the specifics of hydrogeological research was very interesting for the participants. The preliminary hydrogeological survey is necessary to find the source of the water supply and begin drilling a borehole for water extraction.

During training, participants learned about various types of prevention measures for disasters such as landslides, debris flow/mudflow, rockfall, and river bank erosion. The relevant services of municipality city halls are responsible for the selection and design of constructions for prevention, which must take into account geological surveys.

During the presentation of the annual informational geological bulletin, the focus was on statistical data gathered through field surveys during both regular geological monitoring and times of extreme activation of geological hazards. The bulletin contains numerous graphs, diagrams, and maps to aid in visualizing the results of surveys conducted over the past year. Based on this information, it is important to highlight the following data: 1. Quantitative indicators of infrastructural objects, settlements, and residential houses evaluated from a geological perspective, for each region and municipality, during the year. 2 The number of dangerous geological processes activated or newly formed, for each region and municipality, during the past year; 3. A summary table of regions with information on objects in risk zones of natural geological processes and protective measures.

At a presentation on disasters that occurred in Georgia during the last decade, the significance of geological research during times of extreme activation of such events was discussed with practical examples. Participants learned about the specific duties of the disaster liquidation headquarters, which includes representatives from various institutions. Coordination between these representatives is crucial for a timely response.

Rationale

1. **Enhancing Municipal workers Knowledge and abilities:** In a regions vulnerable to numerous natural hazards, it is essential to increase the knowledge and abilities of municipal workers. By ensuring that persons in charge of municipal decision-making are knowledgeable of geological elements that can affect risk developments and their development aversion.
2. **Expertise Import:** This import of expertise sought to fill up knowledge gaps and give municipal leaders advice from professionals of the sector.

3. **Multi-Region Coverage:** The initiative aimed to guarantee that a broad geographic spectrum of municipalities had access to this essential information by conducting the training in all 11 regions of Georgia, including the capital city of Tbilisi. This geographic diversity was crucial for addressing the many geological problems that various locations faced.
4. **Empowering Local Decision-Makers:** The larger objective of decentralizing risk management efforts is achieved by giving local workers the authority to use geological documents for decision-making. A crucial part of preparedness and optimisation of risk-informed decision-making lies with skillful local decision-makers.
5. **Common Understanding:** Synergy and collaboration are fostered when different regions have a shared understanding. This program promoted consistency and cooperation across municipalities by bridging knowledge gaps and facilitating a cohesive approach to geological disaster risk management.
6. **Sustainable Development:** Integrating geological knowledge into the planning process of sustainable local development was at the back thought of seminars. By doing so, it ensured that infrastructure development and other local projects will be carried out with a keen awareness of geological factors, reducing risks and contributing to long-term sustainability.

Attendees and venue of training

The majority of participants came from two departments of municipality city halls - **Architectural Supervision Service**, and **Infrastructure and Spatial Planning Service**. As for the state representative administrations, in many cases, participants were from the **Regional Projects Coordination Service**. Several training sessions were held for different regions, each with its logistical nuances and topics. The date, venue, and number of participants for each session are listed below:

- June 29. Hotel Sheraton. Batumi. Target regions – Adjara and Guria. Participants – 23;
- June 30. Tskaltubo Epic Hotel and Spa. Tskaltubo. Target region – Imereti. Participants – 26;
- July 14, Hotel Leto, Zugdidi. Target region – Samegrelo-Zemo svaneti. Participants – 23;
- July 20. Hotel Crowne Plaza. Borjomi. Target region – Racha-Lechkhumi-Kvemo Svaneti. Participants – 13;
- July 21. Hotel Crowne Plaza. Borjomi. Target region – Samtskhe-javakheti. Participants – 17;
- July 28. Hotel Courtyard Marriott. Tbilisi. Target regions – Kvemo Kartli and Shida Kartli. Participants – 26;
- August 3-4. Hotel Marco Polo. Gudauri. Target regions – Mtsketa-Mtianeti and Tbilisi city. Participants – 15;
- August 10-11. Hotel Esquisse. Telavi. Target region – Kakheti. Participants - 21

Feedback received from participants

It should be mentioned that during all trainings, participants were actively involved and displayed significant interest. They asked questions both during and after the presentations, focusing mainly on the following key issues of concern:

- The representatives of municipalities discussed reconstruction options for areas damaged by geological processes with trainers.
- In some cases, the problem of supervision of the objects under construction due to the shortage of relevant qualified staff was highlighted;
- The appropriate expertise has been done in geological parts of infrastructure projects by relevant accredited companies but despite this, verification of the documentation and the building under construction is needed from the employees of the municipality City Halls too. From this point of view, the participants received plenty of important information from the trainers;
- Many questions were asked about problems with water supply networks in villages, finding new water sources for reservoirs, and conducting hydrogeological investigations.
- The local municipalities have a limited budget, preventing them from conducting effective preventive measures on all damaged objects due to geological processes. They have to seek funds from the central budget.
- The analysis of the accumulated geological data (produced by NEA and part of infrastructure projects) is significantly hindered by the lack of relevant staff (geologists and GIS specialists) in the structure of the municipality;
- It is necessary to create appropriate databases to systematize geological report information for all municipalities.

The practical part of the training was very useful for participants, which included several topics:

- Review of Geological hazards inventory maps for regions and municipalities by settlements. Except for the identification of geological processes, there are lots of spatial objects on these maps, that became the subject of interest for the participants. As an example, the following figure displays a map of Ozurgeti municipality (**Fig. 3**).
- Review of online geological hazards zoning map on the example of Tbilisi city;
- Transfer data from geological reports regarding the assessment of residential houses to an Excel datasheet;
- Practical exercise about geological processes observed in settlements, during which the participants from each municipality independently filled out the relevant questionnaire (**Fig. 4 ,5 ,6**).

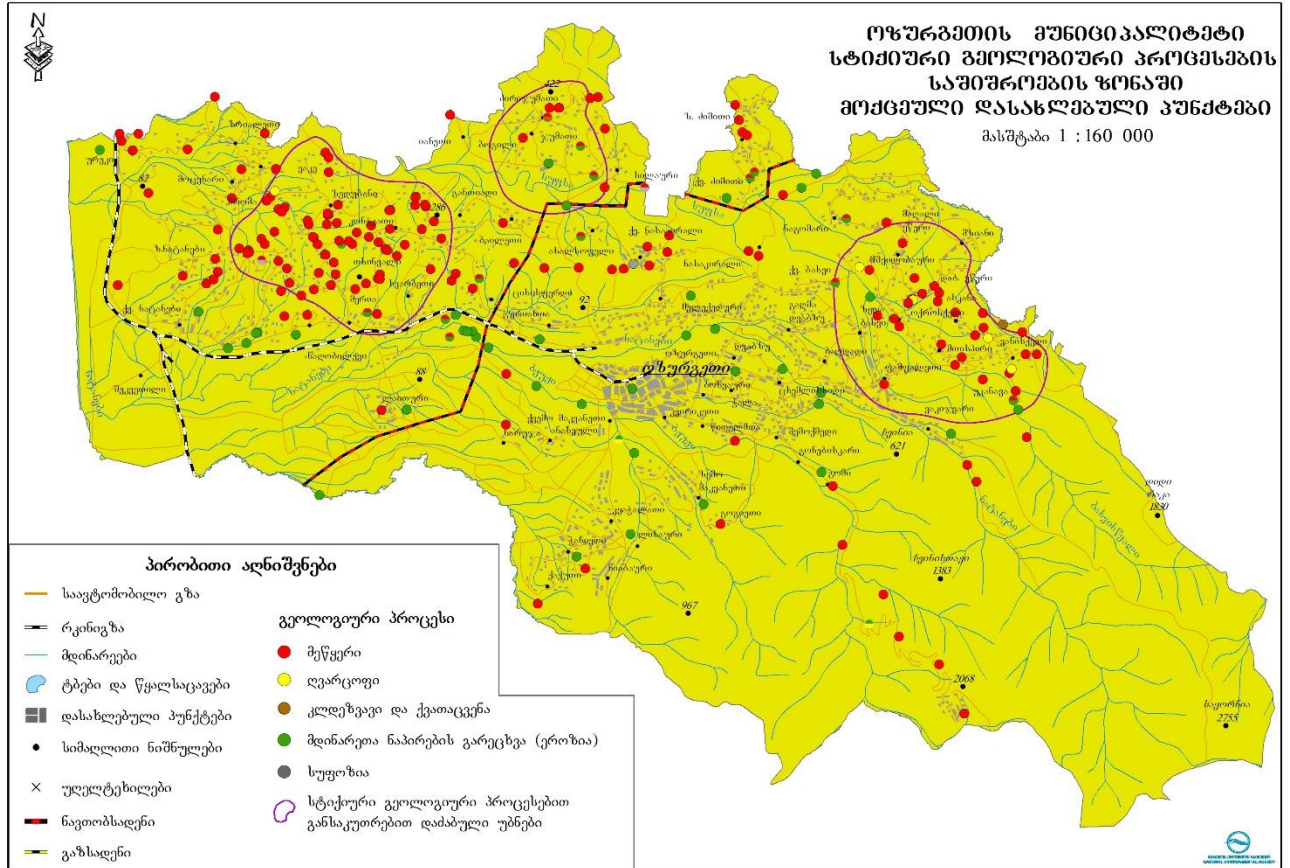


Fig. 3

**List the settlements where, according to your information,
disaster geological processes are recorded**

Municipality		
N	Settlement	Geological process (Landslide, Mudflow, Rockfall, River bank erosion)

Fig. 4



ჩამოთვალეთ დასახლებული პუნქტები სადაც თქვენი ინფორმაციით ფიქსირდება სტიქიური გეოლოგიური პროცესები		
ჭიათურის მუნიციპალიტეტი		
N	დასახლებული პუნქტი	გეოლოგიური პროცესი (მეწყერი; ღვარცოფი, ქვათაცვენა, მდინარის გვერდითი ეროზია)
1.	ჭიათურა	მეწყეი, ეროზიული ჭეხი
2.	ჭიათურა	მეწყეი, ალმატყეხა ჭეხი
3.	ჭიათურა	მეწყეი, გავაჩიხი ჭეხი
4.	სოფ. ხეიანი	ხეივანი, მეწყეი
5.	სოფ. საღვთი	მეწყეი
6.	სოფ. ჯოჯოხეთი	მეწყეი
7.	სოფ. ქვანახე	მდინარის გვერდითი ეროზია
8.	სოფ. ხეივანი	მეწყეი
9.	სოფ. ჭეხვი	მეწყეი
10.	სოფ. იახვანი	მეწყეი
11.	სოფ. სვეტი	ქვანახე, მეწყეი
12.	ჭიათურა	ქვანახე (ხეივანი, ალმატყეხა, ჭეხი)
13.	სოფ. ხეივანი	მეწყეი
14.	სოფ. მოხეხველი	მეწყეი
15.	სოფ. ჭეხვი	მეწყეი
16.	სოფ. ჭეხვი	მეწყეი
17.	სოფ. ხეივანი	მეწყეი
18.	სოფ. ხეი	მეწყეი
19.	სოფ. მღვიმე	ქვანახე
20.	სოფ. ხეი	მდინარის გვერდითი ეროზია
21.	სოფ. ვაჭავი	მეწყეი, ეროზიული

Fig. 5



ჩამოთვალეთ დასახლებული პუნქტები სადაც თქვენი ინფორმაციით ფიქსირდება სტიქიური გეოლოგიური პროცესები		
ონის მუნიციპალიტეტი		
N	დასახლებული პუნქტი	გეოლოგიური პროცესი (მეწყერი; ღვარცოფი, ქვათაცვენა, მდინარის გვერდითი ეროზია)
1	მსყარა ტყე	ლვარცოფი (ლაიქიშოხ)
2	კლოთლა	ლვარცოფი (ლლვიორა)
3	უხურა	ლვარცოფი (მეშყარი)
4	უხურა (ყაიუხი)	ჰინარის ვ. ეროზია
5	ხაიეთი	ეროზია
6	ხიდეშლოტი	მეწყერი
7	კოპი	მეწყერი
8	სოპიტი	მეწყერი
9	ფსოხი	მეწყერი
10	ბაქიბევი	მეწყერი
11	ფარახეთი	მეწყერი
12	სორი	ეროზია, ლვარცოფი
13	ბარი	მეწყერი
14	კომანდელი	მეწყერი
15	შარდომეთი	ეროზია
16	ნივზნარა	ეროზია
17	ლუბი	ეროზია

Fig. 6

Lessons Learned

1. **Active Participation and Engagement:** Participants' enthusiastic engagement and strong attention throughout the training sessions underlined the significance of involving local authorities in disaster risk management debates and activities.
2. **Addressing Local Reconstruction Challenges:** The debates about possible reconstruction strategies for places harmed by geological processes underlined the necessity for specialised approaches that consider the unique geological features of each region. Effective rehabilitation initiatives require localised expertise.
3. **Supervision and Verification:** Given the difficulties in supervising building projects due to a lack of skilled personnel, it is critical to establish effective monitoring and verification systems, especially in disaster-prone locations.
4. **Importance of ToRs and other documentation:** The importance of municipal staff verifying documentation and works in progress was highlighted. This emphasises the crucial part municipal employees play in ensuring that geological safety regulations are followed.
5. **Budget Constraints and Funding Sources:** The inability of municipalities to implement effective preventive measures due to budget constraints highlighted the necessity for smart budget allocation and resource-sharing procedures.
6. **Human Resource Shortage:** The lack of geologists and GIS specialists within municipal structures hinders the analysis of data and further decision-making ability of local governmental bodies. This underlines the importance of capacity building and workforce development in disaster-prone regions.
7. **Data Systematization:** The need to create appropriate databases to systematize geological report information for all municipalities emerged as a critical requirement. This emphasizes the importance of organized data management to support decision-making.

Recommendations for future steps

Over the past few years, there have been significant infrastructure developments in various parts of Georgia, with many more projects planned for the future. However, before construction begins, it's important to conduct preliminary geological assessments of the projected areas and then detailed engineering-geological studies. Accordingly, ongoing communication between municipalities and the NEA is essential for relevant consultations. Additionally, several actions need to be implemented to promote sustainable development in municipalities, regional services, and communities. These actions are provided below in the form of recommendations:

General recommendations:

- Continuing to organize trainings and workshops periodically, for relevant staff of municipalities and state representative administrations about geological topics;
- Relevant activities should be implemented to raise awareness of geological hazards and environmental issues, particularly in mountainous settlements;
- Only Tbilisi city has an online interactive geological hazards zoning map at the moment, which was created by the geology department of NEA in 2019 (**Fig. 7**). It is strongly recommended that all regions have an online map of this type, which will be very useful for all interested citizens.
- Support for expansion/improvement of instrumental geological monitoring network.

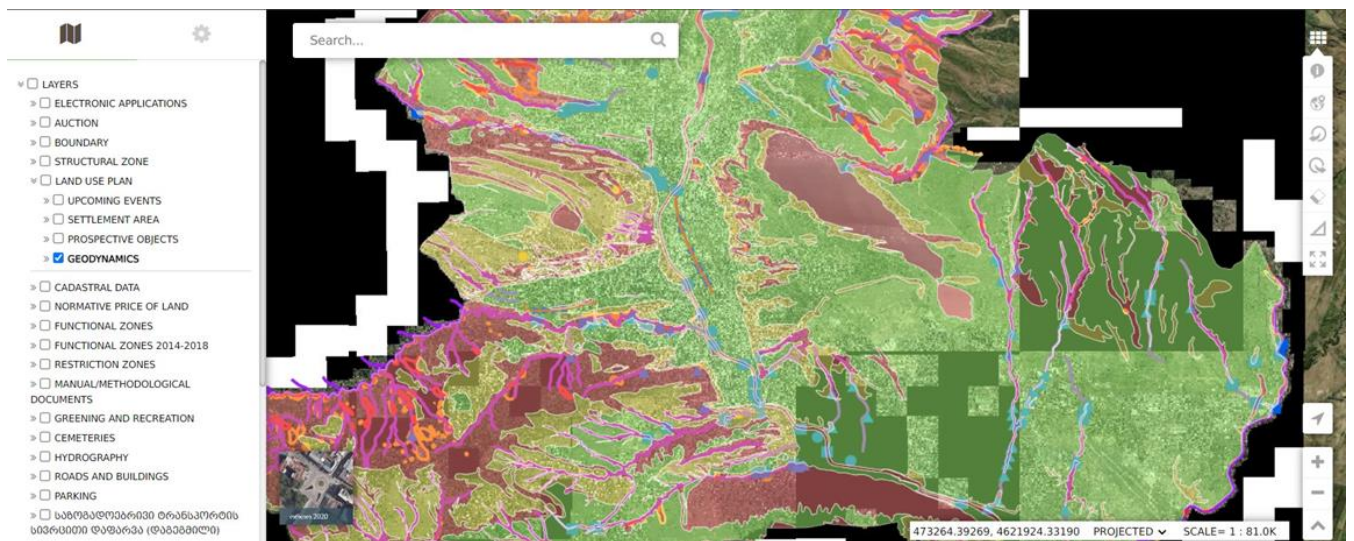


Fig. 7

Recommendations for municipalities:

- In the future, municipalities should consider hiring geologists and GIS specialists when staffing employees;
- Elaboration and implementation of spatial development plans in different regions based on appropriate geological investigations;
- Ensure all ongoing and planned projects comply with the valid construction norms and rules in Georgia, taking into account relevant engineering-geological studies;
- It is essential for municipalities to communicate closely with LEPL Internally Displaced Persons, Eco-migrants, and Livelihoods Provision Agency to register families affected by disasters and under resettlement;
- Conducting preliminary Hydrogeological surveys and preparing relevant reports before starting the activities of provision of water supplies for settlement areas;

- Creating regional offices of the Geology department and strengthening them step-by-step, which will facilitate the response on the activation of geological processes and coordination with municipality services.

Photos of trainings

1. Batumi



2. Tskaltubo



3. Zugdidi





4. Borjomi, day 1.



5. Borjomi, day 2.



6. Tbilisi



7. Gudauri



8. Telavi

