

Building Disaster-Resilient Communities in Armenia's Mountainous Areas through Dam Safety and Risk Reduction Measures

Armenia

Armenia provides an example of a land-locked country with a distinctive mountainous relief and an average elevation of about 1800m above sea level. Most of the territory (71,8%), a huge number of settlements (41%) and a major part of the population (more than 900,000 people) are located in or live under extreme conditions at an elevation of 1500m above sea level.

Most of the mountain communities are remote and somewhat isolated from the national and regional centers and there is lack of information and resources on natural hazards, appropriate teaching and training personnel and head to head education. They are mostly out of reach of the international humanitarian organizations dealing with natural hazards. Many of those communities are located downstream from reservoirs and exposed to the threat of flooding in the case of a major earthquake and secondary hazards that such earthquakes produce.

Most of 82 operating dams and reservoirs in Armenia are located in the mountainous areas 1500 – 2500m above sea level. There are nineteen at-risk reservoirs in the territory of the four regions (marz) namely Aragatsotn and Gegharkunik, and Syunik and Vayots Dzor. The number of rural communities and people exposed to potential hazards are 50 and 65,000 respectively. The selection of communities as well local authorities, teachers and students to be taught and sensitized has been performed on the basis of hazardous dislocation downstream from high-placed reservoirs and the risk of possible flood threat during an onset event, taking into account dam and reservoir characteristics as well as the disaster knowledge and awareness level of the community members.

Earthquakes are the most costly natural disaster in Armenia. The risk of earthquake and subsequent dam failure cannot be reduced to zero. A dam may pose a small risk of failure, but a high hazard should that failure occur, in particular if a dam is situated in seismically active region and if a large number of people live within dam's inundation zone.



Dam failure and flush flood are the secondary hazards triggered by earthquake. Therefore, flush flood protection must be included in risk analysis for dam failure. Dam collapse is possible due to major earthquakes but we most often encounter damage through:

- overtopping of the dam crest;
- erosion of the dam surface due to swift moving waters or wave action;
- abnormal seepage through the dam body due to cracking, etc.

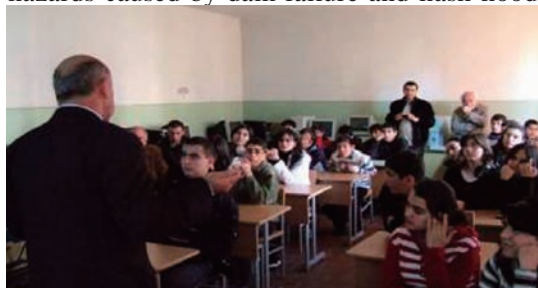
Seismic risk assessment in the mentioned communities was carried out by NSSP specialists, who, specifically implemented community watching, determined secondary hazards in case of an earthquake, examined the risk hazards threatening communities in case of dam failure and compiled seismic risk maps.

The NSSP specialists carried out visual examinations of buildings and structures in all fifty communities and assessed the seismic vulnerability of critical facilities. Assessments of the dams' vulnerability and determinations of flood areas, as well as damage and loss assessment were all carried out. Recommendations were made in regard to the strengthening and retrofitting of critical facilities (dams and reservoirs) and on the strengthening and retrofitting of school premises. After becoming familiar with the current situation, the consciousness of the residents, and available teaching materials we have come to the conclusion that there is a need to develop simple and affordable educational guidelines for professionals and the population living in the inundation zone in order to develop appropriate responses in case of dam failure induced by the earthquake.

Our task is to create mobile resource centers in the various regions for training the rural residents, teachers and students exposed to floods caused by dam failure. At the same time it is clear that there is no sufficient interaction and understanding among the local administration, dam safety engineers and operators, and rescuers in emergency. Joint efforts by the involved parties to cope with a disaster are essential. It is vital that we develop an effective education and training program for community members in areas of possible threat.

The training included the rules of and techniques for interaction between authorities at all levels and emergency workers and response specialists, as well as dam panel engineers and technicians, along with the active participation of active rural residents. An important component of the training is to familiarize teachers and students with earthquake safety steps including hazards caused by dam failure and flash flood. The main objective we hope to reach through the project is the involvement of rural residents in disaster management activities through:

- the education and training of active community members in the four above-mentioned marzes or regions for responding properly to the disaster chain “Earthquake-Dam Failure-Flash Flooding”
- workshops on disaster management methodology at the regional and local levels for all parties which play important roles in coping with calamities, including local officials, dam safety specialists, rural residents, local authorities and teachers and students.



– **Background**

Seismic Risk Reduction State Program

– **Objective**

To involve rural residents in disaster risk reduction

– **Term/Time frame**

9 months

– **Activities undertaken**

Dam safety and population training

– **Major achievements**

Sufficient level of prevention and response

– **Total budget**

USD \$9900

– **Contact details**

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