Lessons Learned From Spitak 1988 Earthquake

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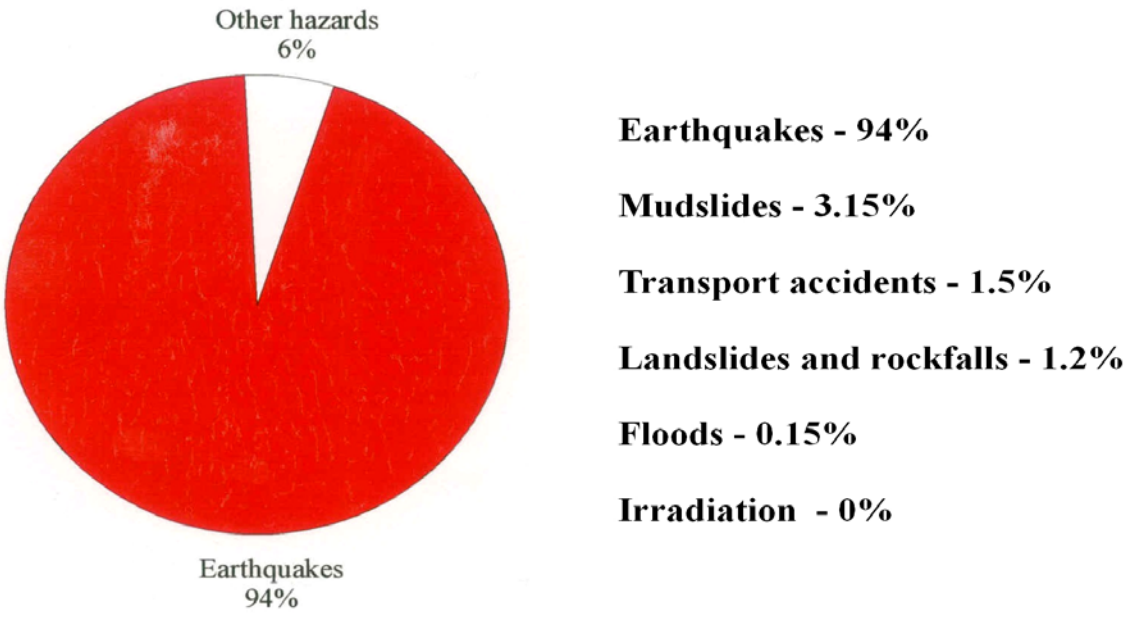
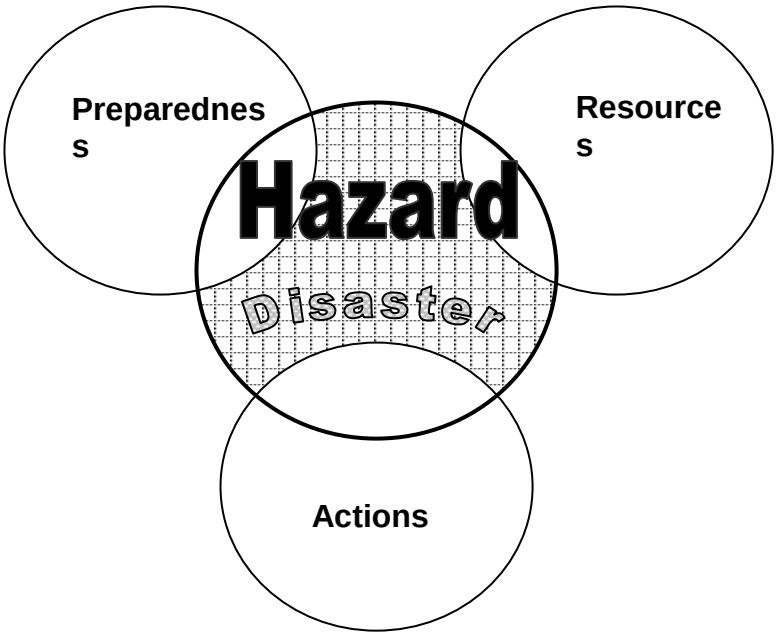
Losses from disaster in Armenia have the following structure (fig. 1):



The loss caused by different types of disasters in Armenia

As one could see the main losses are subject to the earthquakes and so to sustain of earthquakes in Armenia is of strategic importance. From that point of view the population and management bodies preparedness, necessary resources and beforehand developed plans are essential. Their influence on the risk is shown in fig. 2.



$$\text{Disaster} \longrightarrow \frac{\text{Hazard}}{\text{Preparedness} + \text{Resources} + \text{Actions}}$$

fig. 2

Spitak 1988 Earthquake is one of the well-known and studied earthquakes in the world.

The main reasons of Spitak Earthquake disastrous consequences are:
- absence of state management body in the field of seismic protection;
- not proper assessment of seismic hazard;
- absence of state program on seismic risk reduction
- absence of united observation network;
- low seismoresistance of buildings and structures;
- not proper preparedness of population and state management bodies
- lack of experience in the field of disaster management

Proceed from mentioned above Armenian National Survey for Seismic Protection was founded under the Government of the Republic of Armenia on July 17, 1991. The Armenian NSSP was given special governmental status and ministerial power. The President of the Armenian NSSP directly reports to the Prime Minister of the Republic of Armenia.

The main goal of the Armenian NSSP is multidisciplinary Seismic Risk Reduction including all the issues mentioned above.

Armenian NSSP has developed two strategic National Programs on "Seismic Risk Reduction in Armenia" and "Seismic Risk Reduction in Yerevan-city". The Programs, adopted by the Government of the Republic of Armenia on 10th and 7th July 1999 respectively, are designed for period of 30 years. All the Ministries and other Governmental, non-Governmental and private organizations are participating and making their contribution to the National Programs under the general co-ordination of Armenian NSSP assigned by the Government as a responsible body for the Seismic Risk Reduction Strategy development and implementation, which includes:

- Seismic Hazard and Risk Assessment;
- Vulnerability reduction in urban areas, including strengthening and upgrading of existing buildings, design of new building codes and standards;
- Public awareness, people education and training;
- Early warning and notification;
- Partnership establishment involving public and private organizations;
- Risk management, including Emergency Response and Rescue Operations;
- Disaster relief and people rehabilitation;
- Insurance;
- State disaster Law and regulations.

Armenian NSSP has a unique multi-parameter observation network consisting of 150 stations for real-time monitoring of geo-sphere. Armenian NSSP is divided into 4 administrative regional departments with appropriate centers organized according to main objectives and research directions.

Armenian NSSP consists of several administrative departments and centers. Each administrative regional department has uniform subdivisions for solving the whole spectrum of issues on go seismic protection of the country (from seismic hazard and risk assessment to earthquake engineering and earthquake-resistant construction code development, from seismic knowledge dissemination and training of the public to prompt response and rescue operations, etc.). The uniform subdivisions of the Armenian NSSP departments are connected with each other horizontally by the same issues and have strict vertical subordination to the Head of Department, who is under the Armenian NSSP President subordination.

The Armenian NSSP has significant achievements in the field of seismic risk reduction:

- **Seismic hazard assessment.** The first probabilistic maps of Seismic Hazard Assessment (SHA) for the Crimea - Caucasus - Copet-Dagh Test site in the frame of the GSHAP Program, and for the Armenia within the framework of the National Program have been created.
- **Current seismic hazard assessment.** A unique multi-parameter network has been established. It consists of 150 monitoring stations performing round-the-clock data acquisition and analysis via satellites.
- **Seismic risk assessment.** The new methods for seismic risk quantitative assessment, based on the main seismic risk assessment factors (such as seismic hazard level, population density and buildings' vulnerability) have been elaborated.
- **Reinforcement of existing buildings and structures.** New methods for increasing the earthquake resistance of existing buildings and structures have been developed, successfully tested and implemented into practice.
- **New building codes.** Armenian NSSP took part in creation of the first national building codes for Armenia, which are in good accordance with the international standards and requirements.
- **Early warning systems and notification.** An Early Warning System based on the current seismic hazard assessment has been developed and is under the design. A project of Early Warning System based on automatic registration and determination of the parameters of destructive seismic wave propagation is under the development. A project of Early Warning System based on the fast determination of earthquake parameters and damage assessment, as well as human loss is under design.
- **State disaster law and regulations**. The Law on Seismic Protection has been adopted by the National Assembly of the Republic of Armenia and came into force..
- **Risk management including emergency response and rescue operations**. The multidisciplinary well-equipped Armenian NSSP Task Force including seismologists, earthquake-engineers, geo-technicians, communication engineers, medical staff, psychologists, rescuers with sniff dogs, has been created for prompt response to disaster. The Task Force has good experience in carrying out relief operations in earthquake-suffered countries, including recent Gujarat earthquake (January 2001) in India.
- **Public education**. The Public Education and Training Center (PETC) has been established in Armenian NSSP. Educational system (fig. 3.) based on knowledge dissemination through mass media, TV and radio Programs have been developed.

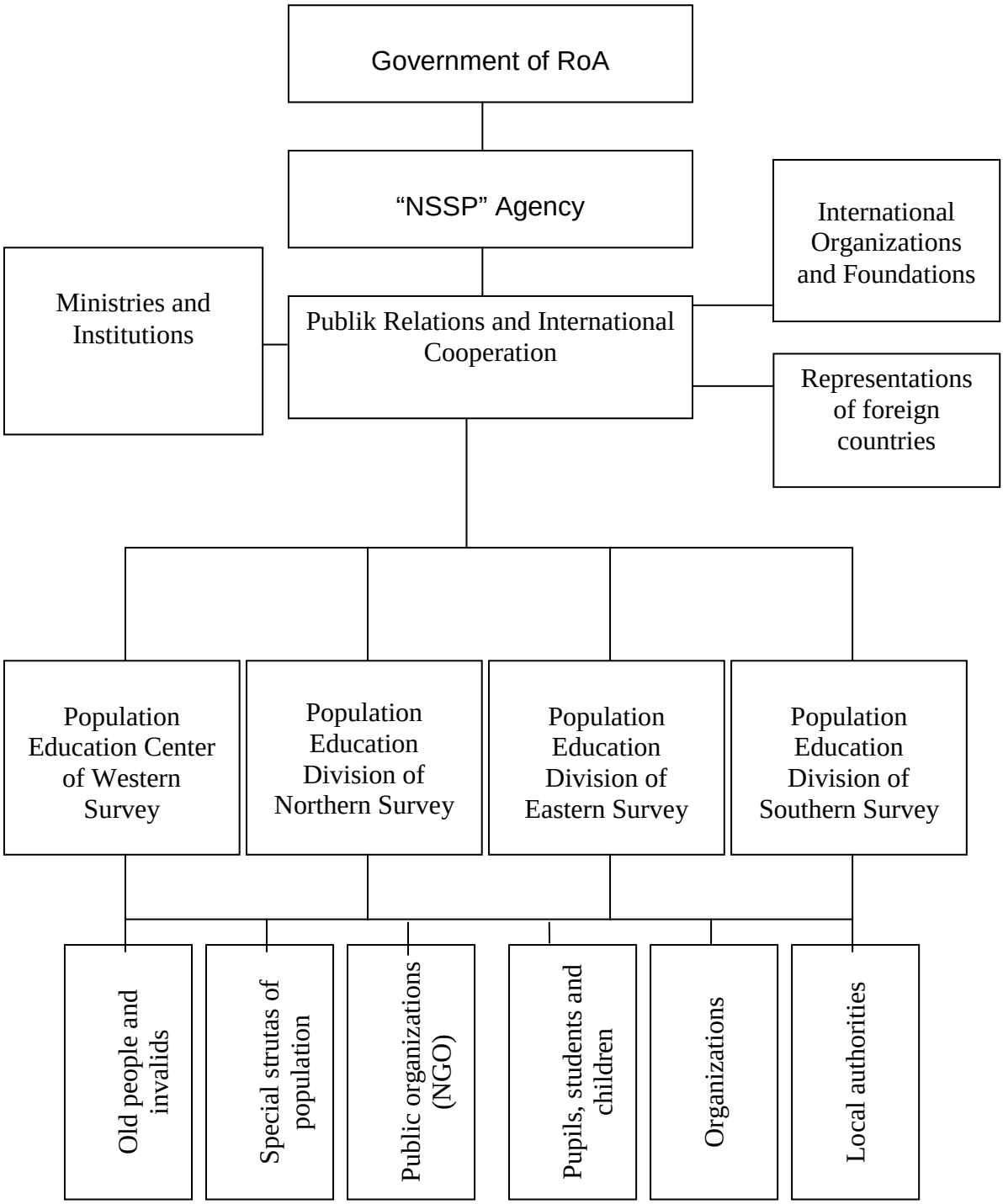


fig. 3.
Scheme of population and management bodies preparedness in the field of seismic protection

Tasks of Public Education and Training Center (PETC) include:
- manuals publishing for seismic protection
- programs creation for mass media
- education of population and officials of state management bodies

Three divisions comprise the PETC:

Educational division develop education themes taking into account the peculiarity of audience, organize the education and support the Task Force with education & training in communities and organizations.
Methodological division study the experience of other countries and develop new methods of education and training taking into account local conditions and peculiarities of students.
Division of sociology and psychology study the social and psychological mood of population, develop social and psychological programs aiming at population social and psychological vulnerability reduction and provide the students with relevant materials.

The role of NGO-s is very important in remote regions and communities.
It is essential to implement additional programs for population and local management bodies preparedness beforehand. The aim of those programs to teach especially such topic which is related to the concrete community. During the education the local resources are used. For example, the heads of small communities know more well the hazards threatening and vulnerable sites of their communities, and it should be used in education programs. It should be taken into account that in case in major disaster the state reserves and capabilities are used in big towns and communities, and remote small communities are somewhat neglected during the beginning stage of disaster. So that community should rely upon itself. It should be taken into account in preparedness education program. It all is taken into account by NGO Syunik International Programs Center which is currently realizing the program entitled " Support for Invalids, Old People and Children in Case of Disaster" in Syunik region capital city Kapan.

The essence of the program is as follows:
1. The Task Force teams of students of high classes are formed which are learnt:
- first medical aid skills
- rescue works skills
2. Data base of invalids, lone old people by districts and by streets is compiled (address, tel. name, age, invalid ID etc.)
- that vulnerable group is learning the Rules of Behavior
3. Each Task Force team are attached to relevant group of invalids
- Task Force teams are permanently working with invalids (from time to time they inform about various failures and disasters.
- assist invalids in everyday matters
4. Training on evacuation and first aid

It is worth to note polls show the works mentioned above have great psychological effect. The members of vulnerable groups become more optimistic and think their life becomes more interesting, and they appreciate their participation in the life of community. They input their initiatives in solving the problems of the community.