

## LIFE PROTECTION AND EARTHQUAKE PREPAREDNESS IN URBAN AND RURAL SETTLEMENTS

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### Abstract

*In seismic areas, present and future generations may suffer because of vulnerable built heritage. Security of life in large and densely populated urban settlements involving protection against multiple hazards/threats of the system depends of exposed elements such as buildings or landscape elements and utility networks, social and economic functions, and population. In rural settlements risks can be different with a higher contribution of natural environmental factors: slopes, areas with high level of groundwater etc. This article will present: - Factors depending of seismic risk, in conjunction with sociology, individual and collective psychology, risk perception and social behavior of human community, government and emergency management; - Seismic education programs in the past 20 years, knowledge and the actions needed to behave rationally and effectively, to deal with rumors, panic, to prevent disasters and survive, strengthen and restore buildings and places and life after seismic events with negative effects; - A new concept and applications offered through the Centre for information, education and training of the population; The new approaches take into account the need to use reliable earthquake engineering researchers of URBAN-INCERC, INCERC Bucharest Branch, for training, to identify the gaps in present public information and to cover all age and professional categories of population and public servants, to teach them practical approaches to protect and cope with disaster impact.*

**Keywords:** earthquake education, seismic risk, Vrancea earthquake.

### INTRODUCTION

Since strong intermediate Vrancea earthquakes occur at large intervals, at present approx. 50% of the exposed population did not live during the direct manifestation of such events.

Thus, the factors influencing the effects size of seismic disaster are closely related and issues in areas such as sociology, individual and collective psychology, risk perception and social behavior of a community, government emergency management and so on, not only those related to the design earthquake.

The social dimension of natural risk is defined primarily by human perception, perceptual

relationship with risk events, community reaction to risk. Perception determines a certain attitude and behavior.

Variation in the perception and assessment of event risk, regardless of social determinants such as age, education, income, is based on the [2]:

- magnitude and frequency of occurrence of extreme events;
- the degree to which the earnings and the interests of company concerned are affected;

- combination of personality factors such as belief in control over destiny, how awareness of the natural environment;
- experience.

Response to risk by adopting new ways of adapting to the environment, to reduce damage caused by hazards is different from individual to community [2]:

- the individual, the estimation of economic efficiency of a method for risk adjustment is based on perceived time factor depending on the ratio of benefits and potential losses and the extent to which alternatives exist.
- for communities, selecting a certain way of adapting to the environment depends on the degree of hazard perception of the individuals constituting the community, of alternatives and welfare of the economy, influenced by the stability and scaffolding of the political power.

The idea of seismic protection was reinforced until now through a series of actions, activities and is believed that public education and communication actions and activities involve seismic disasters deeper and more diverse, in order to reach its goal.

Therefore, will be listed, for completion and understanding, other directions and approaches:

- social psychological aspects, continuous education, not confusing messages, negative perceptions of seismic risk is not prevention, probabilistic estimates lose their significance to the question binary about incidence of earthquake (coming or not coming?)
- use various sources, the information is consistent and repeated, use information channels/media stipulations on individual-level actions (what to do or not to do), use charts, establishing partnerships, providing support through group specialists, adapting materials to local needs, mix of verbal and visual use, use opportunities, potential loss description, evaluation software.

On the other hand, a protective strategy, once developed, cannot be considered as final and immutable. Rather, it should be updated periodically as the social and economic development, as well as new data on a new basis and conceptual knowledge.

## **MATERIAL AND METHOD**

### **Programs, projects and educational campaigns for seismic risk reduction. trends and approaches**

Technical Cooperation Project for Seismic Risk Reduction in Buildings and Structures in Romania, in partnership with JICA and the Government of Romania, National Center for Seismic Risk Reduction (2002-2008...), had involved activities such as the public education for disaster prevention, the dissemination of some post-earthquake evaluation techniques for the damaged buildings, development of codes related to seismic risk, development and dissemination of low-cost building techniques (from tall buildings with flexible floor by introducing viscous fluid seismic dampers on the metal casing in the ground floor and the walls of existing concrete on the first 3 floors of the building)

National disaster preparedness campaign, initiated in 2005 and conducted by the Red Cross Petrom Romania, in 2007-2008, had as main objective to improve the response capacity of communities at risk of disasters.

Among the components of campaign was also the education of 600 pupils on safety rules in case of earthquake (students from six schools in Bucharest, gymnasium, the courses were held by Romanian and Japanese seismologists experts (with support of the Embassy of Japan in Bucharest the Japan International Cooperation Agency (JICA)).

The students have learned about the causes of earthquakes and how buildings behave in such situations and, for example, for a construction in case of risks, the presentation was accompanied by a demonstration. They used a mobile minisimulator for earthquakes and a simulator as a trolley on which were mounted wooden frame houses. It was also presented a flexible roller system that sits construction to mitigate shocks terrestrial system that is used in Japan.

Finally, the students took part in a simulation of an emergency in case of earthquake, which could implement preventive measures explained by the seismologist experts.

M.D.R.T. had financed and developed numerous seismic educational materials for population, to implement these materials in education, most recently in 2007 with four sets of books on "Education and protection of students in case of an earthquake".

## RESULTS AND DISCUSSIONS

### **A demonstration platform and a center for earthquake information, education and training of the citizens**

The objective of the center will be to provide information and education capacity of the population from the seismic zones including training of citizens and mass media network (the media) to communicate with the citizens [1, 3, 4, 5, 6, 7].

From the analysis results that proposed organizing a center for education and training on earthquake behavior (in the URBAN-INCERC Branch INCERC Bucharest) is based on developing a comprehensive program to exploit:

- facilities (spaces/areas designated for earthquake simulations, virtual reality and also for information, education and training and equipment)
- educational teaching materials and dissemination
- involved and induced activities

Regarding training activities, thematic lectures and course content is related to the basics of:

- seismology, geotechnical, seismic engineering
- practical seismic preparedness and prevention/education and disaster preparedness
- prevention of serious effects on earthquake, protection recommendations (population, buildings)
- emergency management (disaster-response relationship, recovery, risk reduction, depending on the components of social, political, cultural, economic and environmental)
- disaster sociology.

The activities for the education, training and public communication on strengthening buildings and earthquake behavior will be supported by e-learning materials and complex

quizzes of general interest, with medium difficulty questions on general knowledge of the learner's initial assessment and planning exercises/simulations for earthquake behavior.

The center will provide a reference center that organizes scientific and logistic activities of education and training in disaster.

The center is a pressing need for Romania in European Research-Development and an effective disaster management has significant impact in reducing loss of life and future economic growth survival and quality of life, creating new jobs and training selectively staff employed on research desiderata simultaneously and disaster management.

By making this investment, some strategic objectives will be achieved:

- will ensure a collaboration with all other centers from Greece, Italy, Japan, USA, New Zealand, etc.
- development research by addressing the fundamental domains/subdomains and applied studies respectively, through provision of equipment, software and hardware, providing access to the most advanced simulation methods, investigation techniques and conventional rehabilitation in line with trends in Europe and worldwide;
- highlight the scientific value of the work in European R & D programs by increasing the number of ISI articles, participation in congresses and conferences, development of research protocols and in collaboration with scientists recognized nationally and globally, reducing the gap to EU research institutions;
- development of activities and services with social and economic impact through the development, planning and provision of equipment and technology, appropriate to European standards;
- optimizing the exchange of information and results within the scientific community made up of academics involved in research development in education, community specialists and the training of scientific and professional training which must attain the performance of university centers EU;
- human resource development through programs such as: master, doctorate,

- postgraduate courses, in order to ensure smooth conduct of education and continue research, attracting a large number of young professionals in international research programs that will be developed in the integrated center by arranging and providing equipment and technology;
- enhancing the quality and diversity of education by providing access to students, graduates and researchers in research and intervention techniques after earthquake disaster by engaging all research departments in a joint effort;
  - greater involvement of engineers in research and research education programs
- European RDI projects launching this complex work requires investment in research and innovation by purchasing equipment and professional scientific level; e-learning materials and questionnaires dedicated target groups and types of skills developed etc.

The Center will develop and use specific tools and advanced technology for knowledge transfer:

- presentations and/or on-line training courses or e-learning, with a virtual dialogue, in correlation with the educational level and the psychological profile of various social and professional categories of population – by age, attributions and previous experience;
- e-learning methods – computer technologies including particularly digital technologies, learning techniques where the student uses the computer, and the Internet for a proper development of distance education;
- earthquake simulating software and protective measures against earthquakes - flowcharts and preparing data for the actual development of the software, based on examples from Italy, Greece, Turkey, Portugal, Japan, USA, New Zealand etc. ;
- “earthquake preparedness certificates” for people who, after training courses and e-learning courses, pass the simulation tests, and people developing other activities within the proposed Center;
- the organization of mid-level courses for individuals and/or technical staff – good

practice rules concerning self-financed buildings, as well as new construction techniques will be considered as alternatives;

- where appropriate, trainers will be trained to teach volunteers in schools how to explain the protective measures to students; or volunteers, e.g. students, to transfer knowledge to communities;
- communication sessions for public institutions, citizens and the media, will include recommendations and anti-seismic protective measures for public institutions and their staff.

## CONCLUSIONS

Earthquake education of citizens is an ongoing process. Preparing for emergencies can contribute significantly to reducing or avoiding loss of life and injuries, to panic, rumors and disruption of social and economic life, reducing the time to return to normal after strong earthquakes and is closely related to the seismic technical protection measures [3, 4, 5, 6, 7].

Correct, continuous and timely information of the population about the situation in affected areas and the interventions, rescue and recovery is a major responsibility of both public institutions and the media. This is in the agreement with the EU Directives on Civil protection and EU Parliament Resolutions about the right to information, education and protection of the population. The press, radio and television should involve, on a long term basis and using specific means, in supplying information about the progress of earthquakes protective systems, education and training of the population to react in a rational way when an earthquake occurs. The knowledge related to earthquake preparedness, individual and group earthquake safety measures may contribute to continuous, clear and accurate information of the population in the aftermath of major seismic events. Apart from the mitigation or prevention of deaths and injuries of the personnel, journalists must be trained to convey information from reliable sources in order to avoid propagation of panic, rumours and disorganization.

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