

The Romanian Program for public earthquake preparedness

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ABSTRACT: The paper presents the concepts and the materials developed in Romania in 1990-1992 in the framework of a National Program for information, education and training of inhabitants, in terms of safety and behavior rules, in order to avoid or to reduce in case of earthquakes, the life losses, excessive injuries panic and disorganisation of economic and social life. The posters, booklets, manuals and the documentary film (Vataman and Georgescu 1991) represent components of a comprehensive earthquake disasters prevention program with engineering background (Georgescu 1988).

1. INTRODUCTION

The seismic hazard of Romania is dominated by the Vrancea intermediate source, at the curvature of the Carpathian Mountains, affecting in South and East about half of the territory and population, while the sources from North and West produce local, shallow earthquakes, as in the figure 1. (Radu 1991). Significant strong motions struck in 1940, 1977, 1986, 1990 (Vrancea) and 1991 (Banloc-Timis).

After the 1990 earthquakes, the Department of Urban and Physical Planning, following a Government Decree, commissioned the Building Research Institute-INCERC and the Institute PRODOMUS S.A. to draft a basic study and subsequent materials for the public earthquake preparedness. The study considered some earlier researches of INCERC (Georgescu 1988) about the necessity to prevent the loss of the public experience gained from past earthquakes and to provide a rational reaction as a human component of a larger preparedness program.

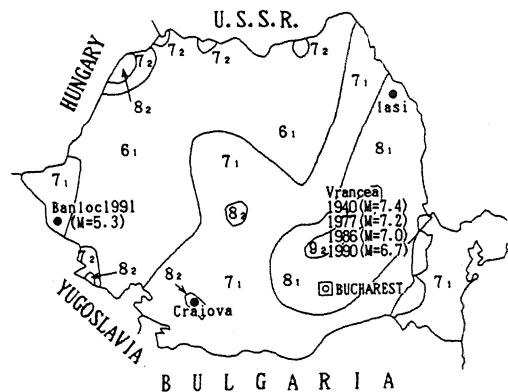
If a formative process of consciousness of earthquake preparedness, as that described by Masuda, Midorikawa, Miki and Ohmachi (1988) is considered, then:

-the motivation is represented mostly by the past Romanian earthquake damages and losses;

-the accumulation of interest and knowledge is supposed to follow the motivation, if methods are properly chosen

-the action for earthquake preparedness efficiency remains to be checked on long term as a parameter in loss reduction.

The losses, the circumstances and the preparedness are presented further on.



Mean return period:

- index 1-minimum 50 years
- index 2-minimum 100 years

Figure 1. The seismic hazard map of Romania (MSK intensities) and the location of analysed earthquakes

2. FACTORS GOVERNING THE HUMAN BEHAVIOR IN PAST EARTHQUAKES IN ROMANIA

The past seismic effects could be summarized as follows for the Vrancea zone:

1940, November 10: 1,000 life loss, many injured, heavy damage (up to 60 millions US\$);
1977, March 4: 1,570 life loss, 11,300 injured, 32,900 collapsed and heavy damaged dwellings, other extensive damage, (2 billions US\$);

1986, August 30/31: slight damage, casualties not reported;

1990, May 30/31: 7 life loss, 100 injured, slight damage.

After the Banloc-Timis earthquake swarms starting on July 12, 1991, 2 life loss, tens of injured, heavy damage of earthen and masonry rural houses were reported (Georgescu 1991).

The Romanian experience (Abraham et al. 1977, 1986, 1990, Georgescu 1988, 1991) has shown that the instinctive reaction to leave the apartments during earthquakes decreased strongly from 1940 to 1990, the occupants being aware of outside existing hazards, especially of the stairways risks. However, many of them entered in panic and some fear of a minority has been transmitted to the majority.

The social response may be summarized as follows:

1940 -panic, rumors and mystic beliefs, in the 2nd World War wake;

1977- good public, official and international emergency management overwhelming other behavior patterns, but gradually the mass media coverage turned to overestimate the personal contribution of the country's leader;

1986- rumors followed by some later panic after a subsequent earthquake in Bulgaria, in absence of any official consideration of the circumstances;

1990- the first earthquake strongly felt during the day time produced panic, jamming, rumors, fear, false predictions. The mass media having now full freedom, but no experience, dispatched some fearful information. There was a combination of emotional and political stresses in that period in Romania, feeding the panic.

INCERC representatives provided some prompt release of correct information, by TV, but the daily newspapers postponed the release of provided papers until the June 21, when the Iran 1990 earthquake struck. (Georgescu 1990).

Thus, some basic information were not available and the 1940 and 1977 experience proved to be too remote, forgotten or not fully transferred to the others in absence of a permanent education.

3. THE CONCEPTS AND MATERIALS DEVELOPED WITHIN THE PROGRAM

The concepts taken into account were:

-the education for preparedness shall be gradual, permanent and using reliable, official backed sources;

-the basic knowledge shall provide safety and behavior rules for all people of seismic zones;

-the specific knowledge shall provide details for different socio-professional and age categories in different environment conditions.

Due to the priority given by past disasters, the urban hazards were firstly addressed.

The posters recommended rules as:

- "In case of earthquake, keep calmly, stay where you are, do not use the stairways or elevators" (Figure 2)

- "In case of earthquake, do not use the stairway" (Figure 3)

- "In case of earthquake, keep away from buildings" (Figure 4)

The pictures were chosen from the 1977 experience.

The posters for general use included:

-10 rules of safety and behavior;

-10 rules of safety inside apartments or houses (securing furniture and appliances) and outside (non-structural members, chimneys, ornaments, fences, etc.)

-single rules on stickers, for children preparedness, as: "In case of earthquakes, protect yourself under a table, desk, doorway."

The first poster for rural zones became necessary after the 1991 seismic swarms of Banloc (Figure 5). The inhabitants of the damaged villages were advised as follows:

"We are living in a seismic zone. For your life safety:

-Do not proceed to unauthorized repair works, observe the mayor's office specialists advice.

-Do not demolish damaged houses without the mayor's office specialists advice.

-Do not build new houses, until the plans and erection permits are approved by the mayor's office.

-Do not live into the damaged houses if there is a life danger warning posted on by the mayor's office."

The poster combined educational and legal issues and was drafted by INCERC with the officials of the Ministry of Public Works, Physical and Urban Planning and printed by the Timis County Prefecture, as boards in charge with the repair and reconstruction works.

The booklets included commented rules, relating occupants, buildings and content, as:

-general rules of antiseismic protection;

-family use rules in situational description (home, school, work, down-town, travel, crowded places);

-simple earthquake engineering knowledge combined with safety and behavior rules. The sequential approach of situations as before, during and after shaking was used.

The earthquake preparedness manual included:

-knowledge on seismology, types of buildings and lessons from past damage in earthquakes in Romania;

-explanations about the importance of inspecting, maintaining, checking and repairing or strengthening buildings, legal issues to be observed;

-the possible typical sensations and behavior of humans in earthquakes, especially in



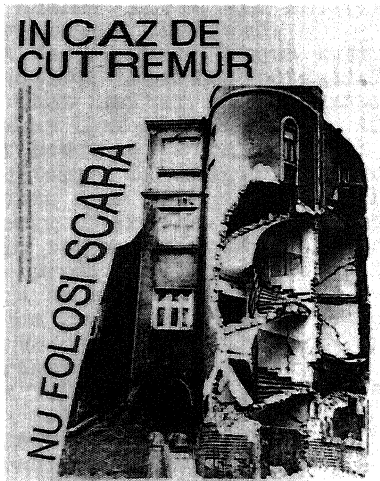
C. DUAT-INCERC-PRODOMUS S. A.



C. DUAT-INCERC-PRODOMUS S. A.

Figure 2. Poster suggesting safety and behavior rules in high-rise buildings

Figure 4. Poster including a single earthquake safety rule for the urban streets hazards



C. DUAT-INCERC-PRODOMUS S. A.



C. MLPAT-INCERC-TIMIS PREFECTURE

Figure 3. Poster providing a single safety rule for mid-rise buildings

Figure 5. Poster for the post-earthquake situation of Banloc, 1991

high-rise buildings;

-commented rules of safety, self-control, survival and behavior, for seismic events during day or night, cold or warm season, etc.

A documentary film scenario, presenting the recommended rules and situations in sequential approach was elaborated.

4. CONCLUSIONS

1. The earthquake preparedness program developed for the first time in Romania educational concepts and materials to be officially addressed to the population. It is expected that gradually the loss of life and excessive injuries, the panic and disorganization will be avoided or reduced due to a rational reaction in case of earthquakes.

2. Taking into account the statistical recurrence of a stronger Vrancea earthquake around the year 2000, this interval should be used to accelerate the education and preparedness of large population categories.

3. The official support and positive contribution of mass-media in Romania are necessary as a long-term policy.

4. The cooperation with countries advanced in these issues, like Japan, U.S.A., China, Greece, Italy, Turkey, etc., as well as the contribution of IAEE, EAEE, UNDRO, UNDP, UNESCO in the framework of IDNDR, will be beneficial for the efficiency of the program in Romania.

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