

A Study on Tools towards Awareness-raising for Disaster Risk Preparedness and Building Resilience in Zagreb, Croatia

Naoko KIMURA⁽¹⁾, Yosuke YAMASHIKI⁽¹⁾, and Ivica KISIĆ⁽²⁾

(1) Graduate School of Advanced Integrated Studies in Human Survivability, Kyoto University

(2) Faculty of Agriculture, University of Zagreb, Croatia

Synopsis

This research aims to propose a tool to raise young citizens' awareness and preparedness towards emergency cases, especially floods, in Zagreb, Croatia. It seeks a possible way to build a bridge between past disaster experience and preparedness in today's life and future in the context of Croatian society. This paper focuses the status of awareness among young generations through analysis of social survey results in order to discuss what means would be necessary for the purpose of raising awareness and preparedness towards disaster risks. It also tries to find if computational tool, as way forward, can be effective as educational tool for awareness-raising. It concludes with a proposal of tool development to form a holistic approach regarding education for sustainable development of Zagreb.

Keywords: disaster risks, flood, awareness, preparedness, youth and children, Zagreb

1. Introduction

Protection of people's lives and property from natural disasters is a critical issue. Millennium Development Goals (MDGs) states, "(We must) *intensify cooperation to reduce the number and effects of natural and man-made disasters*" (UN 2000). International Strategy for Disaster Reduction (ISDR) (2005) asserts, "(We should) *Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation*", "*use knowledge, innovation and education to build a culture of safety and resilience at all levels*", and "*strengthen disaster preparedness for effective response at all levels*" as part of priorities for action. Education for Disaster Risk Reduction (DRR) has more actively been discussed in recent years. Children and youth in international and local societies alike are important stakeholders who play a vital role in DRR and

ISDR prioritizes the inclusion of DRR in all school curricula by 2015 as well as development and implementation of firm action plans for safer schools (ISDR 2009).

The City of Zagreb, Republic of Croatia, is located between Medvednica Mountain and the Sava River, a tributary of the Danube River. Due to the characteristics of its location, a large amount of water was flowed into the city both from the breakage of the river bank and the mountain streams when the city had heavy rain in 1964. The water level of the Sava River reached 514cm and the central part of Zagreb city was flooded and the deepest was about 1m (Maršić 1998). The city had to be suffered from extensive damages on many of its infrastructures and 17 casualties (ISRBC 2009). Having received this bitter experience, the municipality built a modern bank flood protection system along the Sava River, a drainage canal (Sava-Odra Canal), and the retention dams along

some of the mountain streams (Trninic 2001). Thanks to them, the city has had no major flood disaster, at the same time, the memory of such disasters have faded away among its citizens. Today the major concerned disaster for Zagreb is earthquake and it seems that the flood has been seem as one of concatenated disaster by the municipality government and their research groups.

2. Previous Study

The status of education for awareness-raising among young generations toward disaster risks is described in Brief Country Profile “Croatia”, the Report “Children and Disasters – building resilience through education” (UNICEF and UNISDR 2011). It remarks some certain practices for raising awareness among young generation toward disaster risks in Croatia. For example, the national government and National Protection and Rescue Directorate (NPRD), the governmental body related to civil protection issues, are now reviewing the official school curricula and trying to include educational items for DRR in order to raise awareness among young generation. However, it is reported that teachers neither have knowledge nor skills to teach those topics. The Report states *“Knowledge of hazards and risks is included in the school curricula, although not yet at a sufficient level”, “NPRD has partnered the Ministry of Science, Education and Sport to mainstream disaster risk reduction into school curricula”, “The Meteorological and Hydrological Service of Croatia is also providing education and public outreach programmes targeted at increasing awareness of hydro-meteorological hazards”, and “Croatia intensively uses simulation exercises to validate preparedness activities and disaster response operations”*.

There have been some activities and practices taken place in Croatia. How is the status of awareness and preparedness among young generations toward disaster risk now? Have the city’s historical disaster experience been used for the purpose of awareness-raising, if so how? This research conducted social survey to find the current status of young generation regarding their awareness towards disaster risks as well as to learn

how their past disaster experiences have been used as raising awareness strategy.

3. Methodology

This research takes historical floods records and documents as well as a social survey to young generation.

3.1 Historical flood records

This research collects photo records of the historical flood in 1964 for the purpose to see how those have been used for raising awareness. The authors examined several photos taken on the occasion of the huge flood in 1964 and identified the exact locations in the city. The authors took photos at the same location of those photos to produce then-current comparison images. These images will be used to explore how such historical records can help in awareness-raising, keeping the lessons from local disaster experiences, as well as, to take over such indigenous knowledge to the future generations eventually.

3.2 Social Survey – questionnaire

A questionnaire survey to children and youth was conducted in September 2011 for this research. The targeted groups are the young generation whose age is between 12 to 21 years in Zagreb city and the number of the individuals is 208 (Table 1).

Table 1 The number of the respondents

Targeted Groups	n
Children (12-14 years old: primary school)	86
Youth (16-21 years old: secondary school/university)	122
Total	208

The questionnaire was first composed in English by the authors and then translated into local language (Croatian) by local counterparts in Zagreb. Regarding the age of primary school children, it was selected due to their comprehension to the questions in the questionnaire, which was decided based on the check and advice from school teachers.

4. Results

4.1 Historical flood records

The comparison images of the flood in 1964 and a current view of the same locations were produced (Figure 1).



Fig.1 Comparison images: photos taken in the same locations where the flood views were photographed in Zagreb on the occasion of the huge flood in 1964 (left: 1964; right: 2011).

These comparison images were also introduced to the questionnaire respondents on the occasion of survey. There was no one who has seen any of those before observed, and it seemed that these photos were rather well-recognized and a fresh type of material for them to learn. As the city has still kept its traditional dimensions of buildings and plants structure, it became easier and helpful for young generation 1) to image how the flooded city was like, 2) to image a flooded case with the same

amount of water in the city today, thus 3) eventually, to image what and how he/she would react in such a situation.

Regarding these old photos of the historical flood experience in 1964, Zagreb City Museum held an exhibition in 2004 for the purposes of raising awareness and information dissemination on the huge flood in 1964. The exhibition showed the audience how such a huge flood engulfed the city by chronologically introducing the then precipitation data and photos. Video shows and display of evacuation goods such as a rubber boat are shown for education purpose. This exhibition was also open to the media such as newspapers and TVs targeting to the wider population (Muzej Grada Zagreba 2004).

4.2 Social Survey

The social survey on the awareness status among young generations clarified the following three things: 1) 47% of the respondents know about the huge flood in Zagreb in 1964 and their information source was family, 2) a dependency on mobile phone or internet was rather high for both preparedness and information on an emergency case, and 3) nearly 74% think that there may be a flood to happen in Zagreb in 10 years time though they recognize the function of modern flood protection systems such as river banks and canals.

The survey showed the major information source for young generation on the huge flood in 1964 is 'family (62%)' whereas 'school' was chosen by only 7%. Family is a very important information source that children, and this was clearly observed among primary school pupils, and they rely on their family, especially parents, for both preparation and evacuation because they do not know what to do. It was also clarified that many pupils expect a direction from their family when or on a moment a disaster happened. For preparation learning, modern technological tools such as mobile phones and the Internet are the most popular means among the respondents, then traditional means such as 'people' and 'guideline booklets' follow (Fig.2).

A very interesting finding to draw attention is that 74% of respondents think there may be a flood in Zagreb in 10 years, on the other hand, the ratio of

those who has preparation at home was only about 30%. It might tell that their preparation at home or their knowledge about evacuation is not correlated. They may think that a flood is caused only by heavy rain, but actually, this region in Europe has some earthquakes and the possibility of the river bank break or crack cannot be fully denied. The municipality government of Zagreb city has made efforts having produced leaflets on reactions in four types of emergency – earthquake, flood, chemical materials, and radioactive materials – and disseminated to citizens. Yet, it was found that the leaflets are not well recognized and even some university students do not have exact knowledge about evacuation or reaction in emergency case such as earthquake and flood.

Another interesting finding was that there was a similar ratio of respondents who have felt fear of heavy rain or storm and that of those who have preparation at home. The respondents neither have much connection with the Sava River nor spend much time around the River, thus they do not have much time spending in the water environment or any disaster experience thanks to the success of flood protection systems.

At last but not least, a tendency of lower ratio of preparation status in female, compared to male, was observed through an analysis, which might be related to the vulnerability issue of girls/women in emergency cases that is often discussed.

The social survey revealed that young generation in Zagreb is well-aware of the historical flood event and other natural disaster risks. Nearly three-quarter of them answered there may be a

flood to happen in Zagreb in 10 years time, however the result cannot clarify if they really think there will be a flood in the city or they actually assume that it will not happen to them and do not have tangible images of disaster case. In fact, their preparation status and knowledge is quite limited. The survey results showed the ongoing activities on education for disaster risk reduction at public educational arena, in case of Zagreb, may need to be further reinforced so that it comes understood and digested better in young generation so that they can connect their learned knowledge to their own actions to protect themselves and help each other in an emergency case.

5. Discussion

The survey result showed that the most concerned natural disaster in Zagreb was earthquake and flood follows it. However, again, the flood is a concatenating disaster with a large earthquake, thus its occurrence cannot be overlooked. With this in mind, awareness-raising toward unforeseen flood risks is needed to be further developed and well-structured, especially young generation.

The flood experience in 1964 can be more effectively used in order to raise awareness in public arena of flood disaster. Although many photos taken on the occasion of flood in 1964 were exhibited in the museum and such history has been taught at school as part of regional history, young generation recognize their own family as information source. This may tell that such disaster experiences come to people's mind with

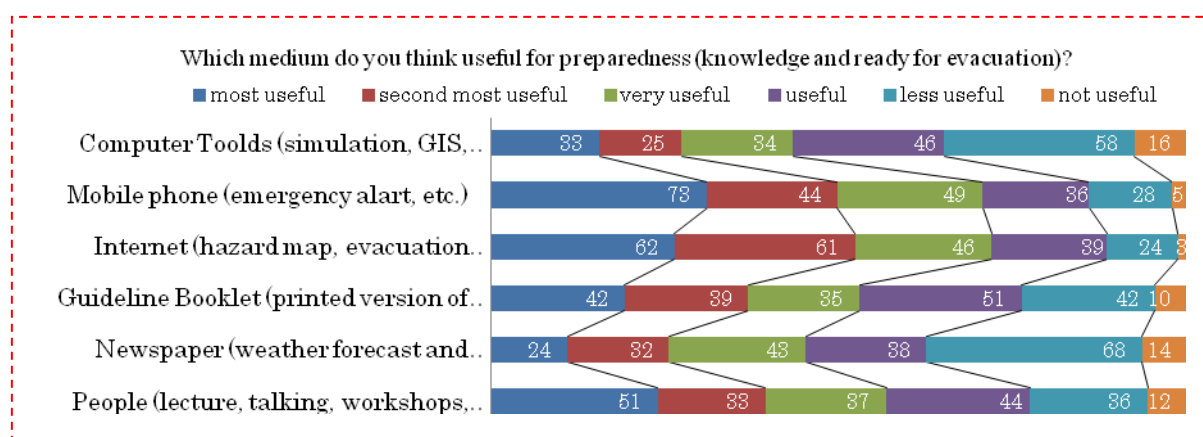


Fig. 2 The absolute evaluation by young generation on preference to the means for preparedness

stronger impact when it was provided by a person who is closed to the listener or has actual experiences. The past experiences including those photos and personal stories can be used more effectively and be included in awareness-raising scheme plan by the government. This type of learning may exert non-verbal education helping people build resilience not depending upon infrastructure.

Mobile phones and internet are widely disseminated among young generation; they were popular means for preparation learning and evacuation information source. Yet, this implies that they assume electricity or mobile phone line services are available even in any emergency cases. Many of young generation may have taken their protected life without disaster for granted and cannot image that phone lines get down or malfunctioned due to a number of accesses at a time. For the government, it needs to maintain the mobile phone operation system under disaster situation along with their protection and rescue policies. This can be a part from which they can learn from disaster prone countries cases, e.g., the Great East Japan Earthquake in March 2011.

As way forward of this research, it is planned to work on a relative evaluation by Analytic Hierarchy

Process (AHP) method. Figure 3 shows a planned flow. This is to make a comparison between the results from absolute evaluation and relative evaluation regarding the means of learning for preparedness. Mobile phone, Internet, and people (lecture/workshop/talk) were the most preferred means of learning for preparedness as a result of absolute evaluation. It is also important to observe consistency – including any similarity or difference – in the results out of absolute evaluation and relative evaluation regarding the same item. This will contribute to reliability of the result.

6. Conclusion

The government of Croatia built a modern infrastructure system, which made a success in protecting the city centre and its citizens. Although the huge flood happened in Zagreb in 1964 is well-known by young generation in the city through their family, it seems that they see this old flood event only as knowledge. Though 74% respondents replied that there may be a flood in Zagreb in 10 years time, it is yet not sure how seriously they see such flood risks as an issue that might come and related to their life. Many of young generation do not know exactly what to do in order to protect themselves or help each other in case of disaster emergency.

As the Report from UNICEF and UNSIDR states, it is observed, through the survey in Zagreb, that there are many educational activities for awareness-raising are ongoing in Croatia. However, many of them may have ended as merely events and not yet sure how much impact they left in young generation in terms of learning and building preparedness and resilience. A holistic approach including old records and talk by senior citizens who experienced past disasters will be necessary in order to build resilience of the whole society. Such means can activate DRR teaching/learning at public educational arena and play indispensable role to reinforce cohesive community.

Flood should be understood a concatenating disaster to earthquake, the most concerned disaster in Zagreb. It is not to scare young generation but to have them prepared so that they react without

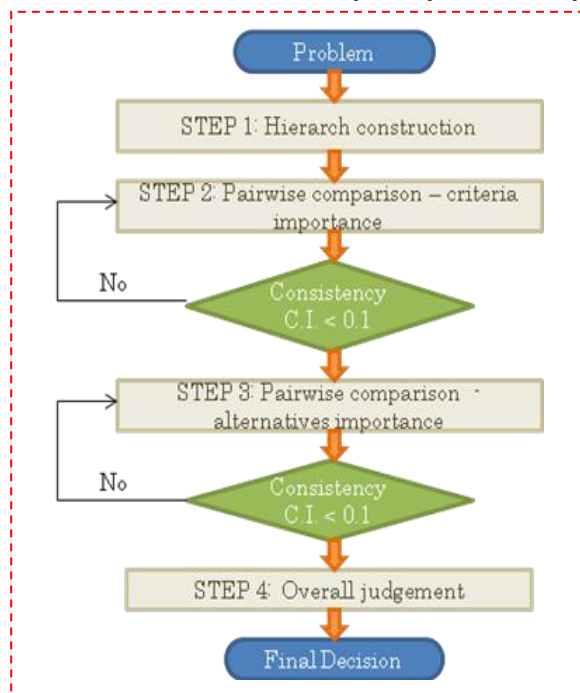


Fig. 3 Analytic Hierarchy Process (AHP) flow for relative evaluation

panicking, thus it eventually leads to sustainable development of the city in future.

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