

THE TAMING OF THE EARTHQUAKE. CAN ROMANIA LEARN FROM JAPAN?

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Abstract

Japan is the best prepared country when it comes to earthquakes. Things are different in Romania, but the earthquake possibility and debate are always present and reflected in the media and people's narratives. This joined research engages in a thorough understanding of earthquakes and their impact by trying to combine a technical and a cultural approach.

Keywords: earthquake, natural hazards, Romania, Japan, prevention, cultural representations

1. INTRODUCTION

In this millennium it is estimated that significant earthquakes will damage several cities and mega-cities located close to regions of known seismic hazard. Several of these estimated earthquakes have already happened, like the Great East Japan Disaster (3.11) or the more recent two in Nepal this spring. A significant body of literature has appeared after and on 3.11 and the reactions to the very recent earthquakes in Nepal make this topic very timely, globally and within the Japan-Romania relations context.

One thing seismology - technology - mainstream theology -and culture - have in common is an insistence on the limits of our knowledge. We still have no way to accurately predict the time of any earthquake before the shaking starts. Expanding on this common point and arguing that there is no action related to earthquakes, if there is no cultural and social understanding of them, the paper is structured into two parts.

The first part is conveying a cultural introduction of the earthquake. In order to ensure an educated Romanian public when it comes to earthquakes, one has to understand how they are represented. Also, to be able to learn from the Japanese example, one has to determine what is transferrable. We shall see for instance that when it comes to fear, different attitudes or beliefs may source from different religious and moral traditions.

The second part discusses the technical management of this natural phenomenon. Vrancea Epicenterranks Romania among the European Countries with the highest seismic activity. Bucharest is considered one of the most vulnerable cities in case of a major earthquake. Public information about shelters, disaster education and retrofiring damaged buildings with a high risk of collapse are projects that the Romanian Government and the civil society invest with significant time and money.

2. CULTURAL REPRESENTATIONS

2.1. Fearing the Earthquake

“Earthquake!” she yells. ‘Did you feel it?’ I swear. She curses. Ordinary words fail us: we mouth obscenities in the cause of reassurance. But they are not enough. When I put the phone down I cannot calm myself. I put my hands out flat in front of me, palms down. They are still shaking. Stop freaking out, Helen, I tell myself. It’s OK. Nothing is broken. Everything is fine. But it is not. The earthquake has brought back all those childhood fears of apocalypse: all the expectation that the world would burn and boil. It is a very old, deep terror and it feels now that it has never gone away. The fabric of the world has torn. I cannot stitch it back together.” (Helen Macdonald – H is for Hawk)

2.1.1. Symbolic Fear

Earthquakes have long been associated with the end of the world in theological and popular imaginations and have held a special significance in Christian apocalyptic tradition. Islamic tradition also has a seismological hint, as earthquakes make several appearances in the Qur’an.

But the association between earthquake and the end of the world is not limited to Western or monotheistic traditions: in Aztec cosmology, the current world is supposed to end with an earthquake, as the previous ones had ended by floods, fire, and storms. A variety of other religious and mythological traditions connect earthquakes with divine anger, indications of doom and cataclysms of the universe.

2.1.2. Statistics Fear

The entire world witnesses an increasing concern about the raising occurrence of natural hazards. The number of related disasters and their impact have increased steadily during the past 20 years. Both are due to increased human exposure (somewhat directly related to the exponential increase in human

population) and to an actual rise in the frequency and magnitude of the hazards (EM-DAT database). The social and economic costs of these natural hazards are substantial, for both damages and recovery (Alexander, 1993; Twigg, 2002; Armaş, 2006).

A proper bearer of the end-of-the-world panic, the largest number of disasters worldwide was registered in the year 2000 (850 events); among these, only 15% were earthquakes and volcanic eruptions. And from the total of 9,270 casualties, earthquakes only caused approximately 5% (EM-DAT database).

Less harmful in a country as well prepared as Japan, such events inflict calamity in developing countries, where the construction of earthquake resistant buildings is not properly accomplished as the capacity of economies to absorb such shocks and costs has been eroded (Blaikie *et al.*, 1994).

It is predicted that the annual fatality rate from earthquakes will rise in the next 30 years, attributable partly to moderate earthquakes near large cities, but mainly from a few catastrophic earthquakes near super-cities (Office of U.S. Foreign Disaster Assistance and the Centre for Research on the Epidemiology of Disasters OFDA/CRED). It is therefore of great urgency to evaluate human perception of seismic risk in assessing social vulnerability in disaster mitigation in large cities. (Armas, 2006)

2.2. Taming the Earthquake - Culturalism in Japanese Attitude

The main reason why Japan is so well prepared, is the frequency of earthquakes (and other natural disasters such as typhoons, etc.) activity in this country. The spotless technological preparation for this calamity is not devoid of education and cultural perceptions of this phenomenon, on the contrary, the two go hand in hand.

A great deal of culturalism related to Japanese attitude to earthquakes relates to

“the extraordinary sense of calm on the Japanese archipelago amid conditions which in perhaps any other place would have led to chaos.”

“The Japanese culture encourages a heightened sense of individual responsibility, but also a very powerful sense of solidarity, and that is a very powerful combination”, considers sociologist Frank Furedi.

“In Japanese culture, there’s a sort of nobility in suffering with a stiff upper lip, in mustering the spiritual, psychological resources internally”, explains anthropologist John Nelson. (National Post, 2011)

Theories abound as to what makes the Japanese so resilient and willing to cooperate. Some cite the centuries-old need to work together to grow rice on a crowded archipelago prone to natural disasters. Others point to the hierarchical nature of human relations and a keen fear of shaming oneself before others.

“It strikes me as a Buddhist attitude,” [...] “Westerners might tend to see it as passivity, but it’s not that. It takes a lot of strength to stay calm in the face of terror.” anthropologist Glenda Roberts declared back in 2011 (Associated Press).

How Japanese people deal emotionally with earthquakes is reflected in their culture in an abundance of ways; but their composed behaviour does not necessarily mean that they detach it from the idea of horror. Let us take the example of the video game *Siren* (サイレン), which takes place in the fictional village of Hanuda, a remotelocale home to a small group of farmers. At the beginning of the game anearthquake and a strange sound (the siren for which the game is named) signal a change of statein the area: it becomes separated from the rest of the world and the lake that surrounds the village turns pink. (Pruet, 2009)

Or we can take the example of the devastating Kobe earthquake as the progenitor of modern films like *Ring* and *Ju-on* (titled *The Grudge* in English). References to these events seem obvious, though narratives are immersed in traditional folklore and therefore the product of modern Japanese ideas about horror.

3. TECHNICAL MANAGEMENT OF EARTHQUAKES

3.1. Earthquake Education in Japan

In May 2010, the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) reported some valuable results on evacuation behaviour principles assessment in an official document titled “Working Groups report for evacuation behaviour based on earthquake disaster prevention researches”. The study is reviling for principles for Earthquake Evacuation Behaviour, verified for the past earthquakes:

- (a) Seeking sturdy furniture as a refuge,
- (b) Protecting your head and hiding your body,

- (c) Not going out from inside after feeling the earthquake
- (d) Checking fire sources when an earthquake occurs.

(a) “Seeking sturdy furniture as a refuge” shows mixed results. When an earthquake occurs with a magnitude of 5 or 6 degrees on the Richter scale, people find it difficult to seek and move into sturdy furniture due to its big shaking. Also, 10% of the casualties in the 1995 Kobe earthquake were due to collapsed furniture, and people were injured while seeking for safe furniture.

Results are therefore mixed: there are both survivor and non-survivor cases from following the four principles. But what this report does is highlighting the importance of an individual making a proper decision concerning his/her situation. In other words, it is down to each person to take the right decisions based on the evacuation instructions (Yun, 2013).

But how does one reach an informed decision within seconds, under the impact of such fundamental embedded fears and reactions as those generated by an earthquake? By learning and training until a good decision becomes reflex, almost like driving a car.

In Japan there are two programs for Disaster Education in primary school. One of them educates and trains teachers in specially organised classes on how to explain to pupils what they have to do in the case of an Earthquake occurring. The other programme brings speakers from the Disaster Preparation Centre to teach the students about survival techniques during a major disaster.

As a result, while the number of casualties was 1,000 in Kamaishi and Kesennuma, only 5 out of 3,244 children and 12 out of 6,054 students, respectively, were victims of 3.11. There are more evidences to suggest that exposure to education may increase knowledge of the threat and lead to more pre-disaster preparedness. Growing out of indirect experience with disasters, prevention training positively affects preparedness behaviour (Yun, 2013).

Yun and Hamada conducted a survey in Kamaishi and Kesennuma and found out that three out of the five children victims didn't attend the Earthquake Disaster Preparation Class. In the interviews, families with small children declared that they uniquely survived due to their child. When the Disaster Alarm started to ring, they decided not to go the designated Shelter (a blasé attitude can develop when one experiences less important earthquakes daily) but the child insisted.

3.2. Earthquake education in Romania

In Romania, the General Inspectorate of Emergency Situations (ISU) is in charge of educational programs. The Inspectorate has partnerships with the Ministry of Education and Research and with other public institutions such as the National Audio-visual Council of Romania which provides material for education and information. On the ISU website one can download flyers and teachers have the duty to inform the students twice during elementary school, once in secondary school and once in high school, as stated by the Order no. 1508/2058/5709 from the 20th of November 2006.

But there is no specific programme regarding earthquake education; moreover, the format and input is the teacher's choice. Observing how earthquake prevention is taught, we discovered that the majority of students had no notion of the common things that one has to do during an earthquake or how to be prepared for a major catastrophe in general.

3.3. Disaster Prevention Day Japan versus Romania

Every year on the 1st of September Japan celebrates Disaster Prevention Day. The date is not chosen by chance: on September 1, 1923 Japan was struck by the Great Kanto Earthquake. With a magnitude of 7.9 it devastated Tokyo, Yokohama and the surrounding prefectures of Chiba, Kanagawa and Shizuoka. It was one of the worst earthquakes in the history of Japan because it coincided with a typhoon that made the fire spread rapidly due to the earthquake. From the 1960s, the Japanese Government declared the commemoration of this earthquake an annual Disaster Prevention Day. Emergency drills organised by the local governments are held throughout the country. Some of them consist in ducking under desks to escape falling objects or evacuating buildings. At numerous elementary and middle schools, September 1 is the first day of classes after the summer vacation; the evacuation drill is part of the back-to-school ceremony.

A Disaster Prevention Day is organized every year in Romania, fixed on the first Tuesday 13 of the year. In 2013 it was held on August 13; in 2014 on May 13. This year it will most probably fall on October 13. On the ISU website the event is presented as follows: *"Some superstitious people consider 'Tuesday 13' an unlucky day, but we claim it is not so. Often we create the 'misfortune' ourselves through mere lack of information. We can prevent this by keeping informed, as John Davison Rockefeller famously stated: 'an informed person is a strong man.'*" On the day of the event, ISU is organising workshops for children and parents in order to inform them about earthquakes and other natural disasters (ISU website).

3.4. Earthquake Risk Management - Japan versus Romania

Disasters often expose pre-existing societal inequalities that lead to disproportionate loss of property, injury and death (Wisner, Blaikie, Cannon, & Davis, 2004). Some disaster researchers argue that particular groups of people are placed disproportionately at-risk to hazards. Minorities, migrants, women, children, the poor, as well as people with disabilities are among those who have been identified as particularly vulnerable to the impacts of disaster (Cutter et al., 2003; Stough, Sharp, Decker & Wilker, 2010). Seismic Risk is expressed with regard of the vulnerability of a building and the hazard that occurs on that place. Romania has one of the biggest risks in Europe, with several big cities and more than 60% of the population living in high and moderate seismicity areas. More than 460 residential buildings are built prior to 1945 and identified as having 1st class risk in case of a strong earthquake. More than 123 of these buildings are situated in the centre of Bucharest, 49 in Iași, 8 in Brașov, Bacău, Bârlad and Vaslui each have 6 vulnerable residential buildings, 4 are in Braila, 2 in Campina and 1 in Buzău, Roman and Târgu-Mureș respectively, as shown in Table (Ministry of Regional Development and Public Administration of Romania).

Table 1: Evaluated Buildings in Romania (according to Ministry of Regional Development and Public Administration of Romania)

County	Seismic Risk Class				Number of evaluated buildings	Total number of buildings	Total number of residents
	I	II	III	IV			
Bacău	6	28	5	2	98	172.612	583.590
Botoșani	36	22	-	-	68	125.215	398.932
Brăila	30	1	-	-	54	76.133	304.925
Brașov	11	8	4	-	48	91.701	505.442
Bucharest	374	302	75	6	2.560	113.863	1.883.425
Călărași	-	1	2	-	4	92.485	285.107
Caras-Severin	9	4	1	-	14	76.349	27.277
Constanța	9	14	3	3	69	126.826	630.679
Covasna	1	1	1	-	3	57.159	206.261
Dâmbovița	-	5	1	-	13	161.455	501.996
Galați	79	34	2	-	115	116.455	507.402
Ialomița	-	-	3	-	5	82.482	258.669
Iași	2	11	6	-	264	172.290	732.553
Mehedinți	1	17	-	-	28	91.553	254.570
Olt	6	-	-	-	6	140.813	415.530
Prahova	41	23	8	-	74	213.052	735.883

Teleorman	1	-	35	-	47	133/611	360.178
Tulcea	3	-	-	-	14	66.446	201.468
Vâlcea	-	1	1	-	33	132.982	355.320
Vrancea	-	6	17	-	23	112.046	323.080

After the technical evaluation of buildings, according to the Earthquake Design Codes, the buildings are assigned to one of the four Seismic Risk Classes. Class I covers buildings with the highest risk of collapse in case of earthquake. Class II represents buildings that can suffer major structural degradations but don't lose stability. Class III represents buildings that would not incur major structural degradation, but the non-structural elements may suffer major degradation during an earthquake. Finally, class IV represents buildings that behave as were designed to (P100-3/2008). After 1998, public authorities marked the Class I Seismic Risk buildings with a red dot.

Hospitals, schools and administrative governmental buildings are designed as Class I and II importance, according to the Earthquake Design Code P100/1-2013. This importance class is given by the importance factor $\gamma_{I,e}$, a variable that makes the value of the earthquake force bigger than the real one. The Class I and II buildings can resist to a bigger earthquake force than an ordinary building, as shown in Table 2 (P100-1/2013).

According to the Romanian Ministry of Health there are 68 severely damaged hospitals that require immediate technical assessment. The Ministry of Education and Scientific Research also declared vulnerable 95 schools; only half of them are included in programs for rehabilitation or have been rehabilitated in the last years.

Table 2: The Importance Factor According to P100/1-2013

The importance class	Building type	The importance factor
I	Essential buildings: - hospitals that have an Emergency Room and/or a Surgery Room; - Fire stations, police buildings, garages for Emergency Services and multi-story car parks; - Power Plants; - Buildings that store explosives, toxic gas or other dangerous substances; - The General Inspectorate of Emergency Situations buildings; - Emergency Situations Shelters;	1.4

	- Essential buildings for Public Administration; - Essential buildings for National Security; - Water tanks.	
II	Buildings that represents a major risk for public safety if they are severely damaged or collapse: - Hospitals, others than Class I, that have a capacity of more than 100 people; - Schools, high schools and university buildings with a capacity of more than 250 persons; - Apartment or office buildings with a capacity of more than 300 people; - Conference rooms, theatres, cinemas, exhibition halls with a capacity of more than 200 people, stadiums and tribunes; - Museums and National Cultural Heritage buildings; - One-storey buildings, malls or other buildings with a capacity of more than 1000 people; - Multi-stored car parks with a capacity of more than 500 cars, others than Class I; - Jails; - Power plants; - Buildings with a total height larger than 45m;	1.2
III	Ordinary buildings, other than the other classes.	1.0
IV	Buildings with a low importance in public safety such as agricultural or provisional buildings.	0.8

In the last 10 years, from the 123 highly vulnerable buildings in Bucharest, only less than 15% were fully retrofitted.

Looking at those numbers we can conclude that Romanian authorities lack interest in Earthquake Risk Management. A big earthquake has a 50-year recurrence in Romania, so the Government finds that it's time to take action; but no general or local plan exists, not even micro-planning. People have no idea where to shelter in case their building collapses during an earthquake; schools and public buildings that are officially designated as shelters in case of a natural hazard are not equipped with first aid supplies. Some buildings have an atomic shelter in the basement but usually that shelter is closed and the Building Manager holds the key; there are no provisions or supplies stored in these shelters.

Japan, on the other hand, is famous for prevention programmes. Every neighbourhood has a map with a designated shelter. Supplies such as solar chargers or can food are cheap and easy to buy and store. The “earthquake survival bag” is a common thing that Japanese people carry or store near their beds or within reach. Other than the General Inspectorate of Emergency Situations and the Red Cross, Japan has numerous active volunteers (doctors, engineers or other trained specialists) that can be found in easily accessible databases and they are very well prepared to help in case of an emergency.

CONCLUSIONS

Romania’s earthquake risk, even though one of the highest in Europe, is far from Japan’s, due to geographical positioning. Nevertheless, the comparison can be extended to a developing versus developed country when it comes to the risks incurred. Even though culturally managing such natural hazards is very different from one case to the other, prevention techniques passed via consistent education from primary school onwards are easily accessible and uncstly. In this respect, Romania has yet a lot to learn from Japan.

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