SOCIO-ECONOMIC FORMS OF INEQUALITY
University of Novi Sad, Faculty of Technical Sciences,
Novi Sad, 2014.

Natural disasters and their impact: socio-economic issues[1]

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Abstract

The paper describes the characteristics of natural disasters with respect to their scope, type and socio-economic features. On the basis of the data collected in an empirical research the paper investigates the level of knowledge of the population regarding natural disasters and their readiness to face them. The main sources of information are: relevant documents, statistical data, scientific and professional literature, empirical research.

Key words: *natural disasters, socio-economic issues, awareness, population, Serbia, Kanjiža.*

Introduction – disasters: definitions and types

According to the Centre for Research on the Epidemiology of Disasters – CRED, disasters are defined as "a situation or event which overwhelms local capacity, necessitating a request to a national or international level for external assistance; an unforeseen and often sudden event that causes great damage, destruction and human suffering" (Guha-Sapir, D., Vos, F., Below, R., Ponserre, S. 2012: 7). EM-DAT differentiates two categories of disasters: natural and technological. The data base includes those disasters that fulfill at least one of the four conditions: ten or more people died; 100 or more people were struck by the disaster; a declaration of a state of emergency; a demand for international help. Natural disasters are divided into five

1 This study represents one of the results of the project "Joint disaster management risk assessment and preparedness for the Danube macro-region" (SEERISK - SEE/C/0002/2.2/H.) Project funded by South East Europe Transnational Cooperation Programme.

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subgroups (biological, geophysical, hydrological, meteorological, climatological) and include 12 types of disasters and over 30 subtypes.

- **Biological:** Epidemic, Insect Infestation, Animal Stampede
- **Geophysical:** Earthquake, Volcano, Mass Movement (dry)
- **Hydrological:** Flood, Mass Movement (wet)
- **Meteorological:** Storm
- **Climatological:** Extreme Temperature, Drought, Wildfire

Biological disasters are defined as "disasters caused by the exposure of living organisms to germs and toxic substances". **Geophysical disasters** are "events originating from solid earth". **Hydrological disasters** represent "events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up". **Meteorological disasters** are "events caused by short-lived/small to meso scale atmospheric processes (in the spectrum from minutes to days)". **Climatological disasters** are "events caused by long-lived/meso to macro scale processes (in the spectrum from intra-seasonal to multi-decadal climate variability)".[5]

Table 1. Subtypes of natural disasters

NATURAL DISASTERS				
Biological	**Geophysical**	**Hydrological**	**Meteorological**	**Climatological**
-**Epidemic** * *Viral Infectious Disease* * *Bacterial Infectious Disease* * *Parasitic Infectious Disease* * *Fungal Infectious Disease* * *Prion Infectious Disease* - **Insect Infestation** - **Animal Stampede**	-**Earthquake** - **Volcano** - **Mass Movement (Dry)** * *Rockfall* * *Landslide* * *Avalanche* * *Subsidence*	- Flood * *General Flood* * *Flash Flood* * *Storm Surge / Coastal Flood* - **Mass Movement (Wet)** * *Rockfall* * *Landslide* * *Avalanche* * *Subsidence*	- Storm * *Tropical Cyclone* * *Extra-Tropical Cyclone* * Local Storm	- **Extreme Temperature** * *Heat Wave* * *Cold Wave* * *Extreme Winter Condition* - **Drought** - **Wildfire** * *Forest Fire* * Land Fire

Source: The table was based on the data from Guha-Sapir, Vos, Below, Ponserre (2012: 9).

5 Definitions of all natural disasters are given after Guha-Sapir, Vos, Below, Ponserre (2012: 7).

In comparison with other types of natural disasters, in the regions of Asia, Africa, America and Europe the most wide-spread type are hydrological disasters. Of the total number of hydrological disasters in 2011, 43.93% occurred in the Asian region, 25.43% in Africa, 24.28% in America and 5.78% in Europe. Simultaneously, they make up 52.05% of the total number of disasters in the Asian region, 68.75% in Africa, 45.16% in America and 55.55% in Europe. The second most frequent disasters are meteorological natural disasters. In comparison with the total number of meteorological disasters, they are the most frequent in Asia (36.90%) and in America (39.29%). Geophysical disasters in the Asian region are the third most frequent in this continent although their share in the total number of geophysical disasters on all continents is the largest (77.78%). With the exception of Europe, the same remarks could be made for 2011 as well as the yearly average in the period 2001-2010. In comparison with the previous period, there were less climatological, hydrological and meteorological disasters in Europe (Table 2).

Table 2. Natural disasters per continents, average for the period 2001-2010 and for 2011.

Natural disasters		Africa	Americas	Asia	Europe	Oceania	Global
Climatological	2011	11	13	11	2	2	39
	Aug. 2001-10	9	12	11	17	1	50
Geophysical	2011	0	5	28	1	2	36
	Aug. 2001-10	3	7	21	2	2	35
Hydrological	2011	44	42	76	10	1	173
	Aug. 2001-10	44	39	82	24	6	195
Meteorological	2011	9	33	31	5	6	84
	Aug. 2001-10	9	34	40	14	7	104
Total	2011	64	93	146	18	11	332
	Aug. 2001-10	65	92	153	58	16	384
%							
Climatological	2011	0.17 28.20	13.98 33.33	7.53 28.20	11.11 5.13	18.18 5.13	100.00
	Aug. 2001-10	13.84 18.00	12.90 24.00	7.19 22.00	29.31 34.00	6.25 2.00	100.00
Geophysical	2011	0 0	5.38 13.89	19.18 77.78	5.55 2.78	18.18 5.56	100.00
	Aug. 2001-10	4.61 8.57	7.61 20.00	13.72 60.00	3.45 5.71	12.50 5.71	100.00
Hydrological	2011	68.75 25.43	45.16 24.28	52.05 43.93	55.55 5.78	9.09 0.58	100.00

	Aug. 2001-10	67.69 22.56	42.39 20.00	53.59 42.05	41.38 12.31	37.50 3.08	100.00
Meteorological	2011	14.06 10.71	35.48 39.29	21.23 36.90	27.78 5.95	54.54 7.14	100.00
	Aug. 2001-10	13.85 0.96	36.96 32.69	26.14 38.46	24.14 13.46	43.75 6.73	100.00
Total	2011	100.00 19.28	100.00 28.01	100.00 43.98	100.00 0.30	100.00 3.31	100.00
	Aug. 2001-10	100.00 16.93	100.00 23.96	100.00 39.84	100.00 15.10	100.00 4.17	100.00

Sources: calculated on the basis of absolute values taken from Guha-Sapir, D., Vos,.F., Below, R., Ponserre, S. (2012). Annual Disaster Statistical Review 2011. The numbers and trends. enter for Research on the Epidemiology of Disasters (CRED). Institute of Health and Society (IRSS). University catholique de Louvain. Brussels, Belgium, p. 33.

The analysis according to the type of natural disasters indicates that in the period 2002-2011, at the level of a annual average, the first three types of disasters were: floods (175), storms (102) and earthquakes (29). During 2012 there were more floods (121), storms (77) and extreme temperatures (49). In the same year the number of extreme temperatures and droughts was greater than the annual average for the previous ten years. For examples, in 2012 there were 49 registered extreme temperatures while the annual average for the period 2001-2011 was 21. An increasing share of extremely high or low temperatures as well as droughts, floods and storms, indicates a growing influence of climatic changes on the lives and health of people (Diagram 1).

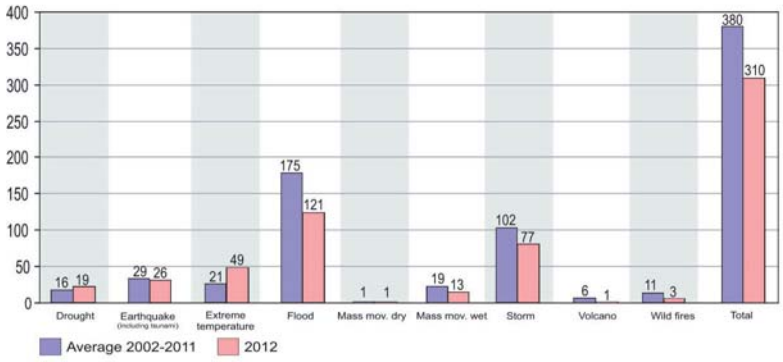

Diagram 1. Number of natural disasters per type.

*Source of data***:** *EM-DAT: The OFDA/CRED – International Disaster Database www.emdat.be Université catholique de Louvain Brussels – Belgium.*

Distribution of natural disasters

(a) Scope of distribution

The dynamics of the number of natural disasters in the period 1975-2012 indicates their increase with a heavy oscillation in different years. The largest number of natural disasters, over 400 of them, happened in 2000 (413), in 2002 (421) and 2005 (432). In 2012 there were 310 registered natural disasters, which was 122 less than in 2005, when there was the largest number of natural disasters in general (Diagram 2).

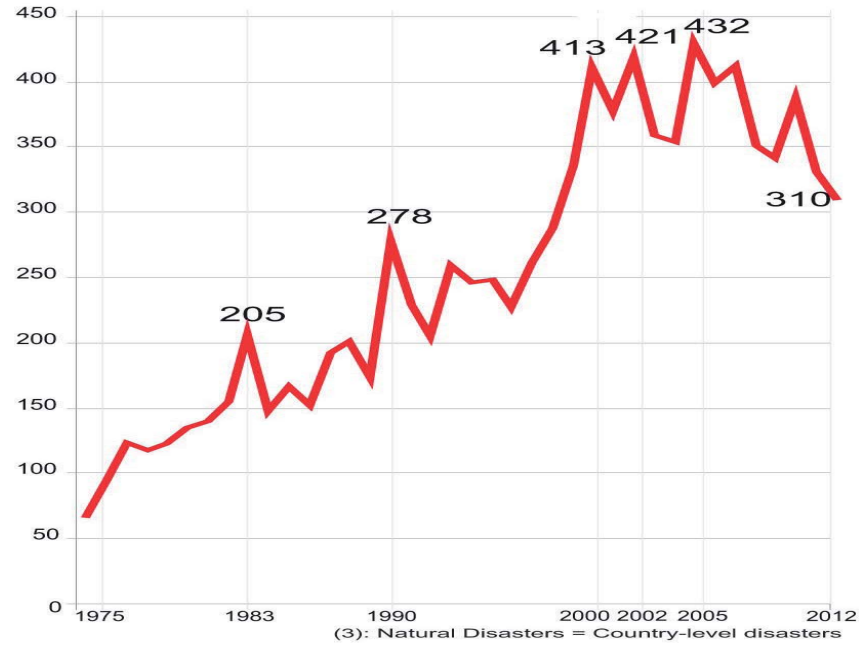

Diagram 2. Dynamics of natural disasters in the period 1975-2012.

*Source of data***:** *EM-DAT: The OFDA/CRED – International Disaster Database www.emdat.be Université catholique de Louvain Brussels – Belgium.*

The data on natural disasters that occurred under the influence of climatic changes on the global level in the period 1980-2011 indicate their large frequency. In 32 years there were 3455 floods, 2689 devastating storms, 470 droughts and 395 extreme temperatures (UNISDR, 13 June 2012).

In the period of 20 years, from 1992 to 2012, 64% of the world population experienced some kind of a natural disaster (Impact of Disasters since the 1992 Rio de Janeiro Earth Summit 2012).

During the last decade China, the USA, the Philippines, India and Indonesia belonged to the group of countries most often struck by a natural disaster. The number of natural disasters in 2011 singled out the following countries: the Philippines, the USA, China, India, Indonesia, Mexico, Brazil, Nepal, Japan and Guatemala. In total 141 natural disasters occurred in these ten countries (14 climatic, 20 geophysical, 64 hydrological, and 43 meteorological). It can be noticed that hydrological disasters are on the rise. In the same year the total number of casualties (dead and endangered) was 245 million. In 2011 the Philippines were struck by the largest number of natural disasters in their history, i.e. as many as 33 (18 floods and landslides, 12 storms, 2 volcanic eruptions and one earthquake). If we compare the data from 2011 with an annual average of victims of disasters in the period 2001-2010, we can notice an increase. This is explained by the wider influence of hydrological disasters, which resulted in 139.8 million victims in 2011, while the annual average for the period 2001-2010 was 106.7 million (Guha-Sapir, Vos, Below, Ponserre, 2012: 1, 14).

In comparison with the most endangered countries, the number of natural disasters in the region of Serbia is much smaller. From 1980 until 2010 ten disasters were included in the UNISDR data base. In these disasters nine people were killed, while 48,010 people were endangered. Material damage was estimated to 132 million US dollars (Serbia – Disaster Statistics, UNISDR).

(b) Endangered population

The comparison of data at the level of the annual average for the period 2002-2011 with the data from 2012 indicates that the biggest portion of population was endangered by floods, droughts and storms. Of the total number of people endangered by various natural disasters, the average for the period 2002-2011 indicates that 47.42% of people suffered the consequences of floods, 29.24% suffered the consequences of droughts and 16.17% suffered the consequences of storms. The same tendency was noticed for 2012. Besides influencing the lives and health of people, floods, droughts and storms have also affected the economy of households, regions where they occurred and even wider.

Casualties caused by natural disasters were most often a consequence of earthquakes, storms and extreme temperatures. Out of 106,890 people who died in the period 2002-2011, 63.54% died in earthquakes, 16.24% died in storms, and 13.65% from extreme temperatures (Diagram 3).

Diagram 3. Endangered population and casualties per kind of natural disaster.

Source of data: EM-DAT: The OFDA/CRED – International Disaster Database www.emdat.be Université catholique de Louvain Brussels – Belgium.

The data for 2012 as well as the data for the annual average for the period 2002-2011 indicate that natural disasters are most widespread in the region of Asia. More than three fifths of the total number of casualties come from this continent. The smallest share of casualties was recorded in Oceania, from 0.14% at the level of the annual average to 1.07% in 2012. The share of casualties in Europe reaches almost 13%. During 2012 a rise was noted in the portion of casualties in natural disasters in the region of Africa (from 1.23% to 10.92%) and a drop was noticed in the number of casualties in the American continent (from 23.19% to 10.61%) (Table 3).

Table 3. Casualties in natural disasters per continent, average 2002-2011 and 2012, percent

Years/ Continents→	Europe	Asia	Oceania	Africa	America
2012	12.99	64.41	1.07	10.92	10.61
2002 - 2011	12.82	62.62	0.14	1.23	23.19

Source: the table was based on the data excerpted from EM-DAT: The OFDA/CRED – International Disaster Database www.emdat.be Université catholique de Louvain Brussels – Belgium.

The number of inhabitants of an area changes under the influence of climatic changes and natural disasters. The permutation of cause and effect in the sense that the increase of population causes climatic changes is considered to be faulty deduction (Satterthwaite, 2009). Climatic changes as well as the disasters that are caused by them have multiple effects on the health of people (Ahern et al., 2005; Shultz et al., 2005; after Few & Tran, 2010) and other living beings (Morley & Lewis, 2013). Old people, women and children are considered to be especially sensitive demographic groups (Curtis & Oven, 2012). If the generational sensitivity is tied to poverty, the endangerment of health can be even greater.

(c) Economic loss

Besides social issues, which include both endangered population and casualties, we can also identify economic and ecological consequences of natural disasters (International Strategy for Disaster Reduction, 2014). Economic consequences have a powerful effect on the way and quality of life.

For example, climatic changes and natural disasters cause changes in traditional economy, primarily agriculture, as well as in socio-demographic structure of population (Kiem & Austin, 2013). Empirical research indicates the influence of natural disasters on the territorial mobility of population (Halliday, 2006). For instance, droughts are a motivating factor behind the work migration of male population (Gray, 2012).

The greatest economic damage is caused by earthquakes and hurricanes. In the period 1980-2012 the greatest material damage of 214 billion US dollars was caused by an earthquake which caused a tsunami in Japan in 2011. As a consequence of the devastating effect of a hurricane, great economic loss was noted in the USA in 2005 in the amount of 182 billion US dollars. Ten years before, in 1995, an earthquake caused damage in the region of Japan in the amount of 150 billion US dollars. Somewhat smaller damage in the amount of 90 billion US dollars occurred in China in 2008 and was also caused by an earthquake. In Italy in 1980 an earthquake damaged objects in the amount of 55 billion US dollars (Diagram 4).

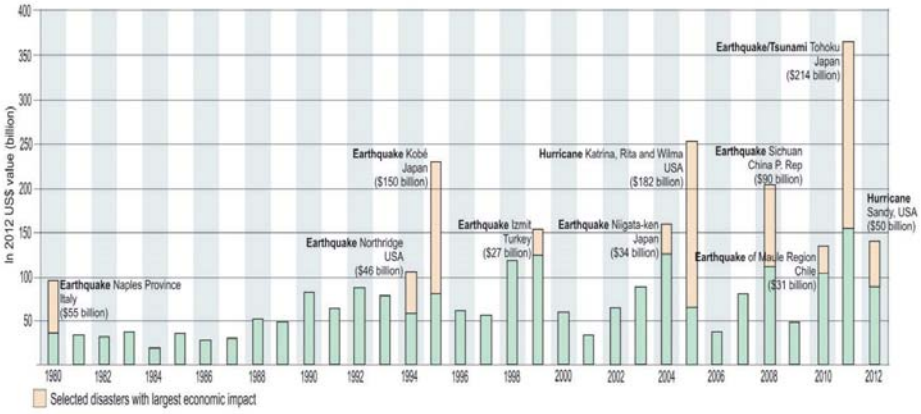

Diagram 4. Economic damage caused by natural disasters, 1980-2012.

*Source of data***:** *EM-DAT: The OFDA/CRED – International Disaster Database www.emdat.be Université catholique de Louvain Brussels – Belgium.*

According to the data based on the annual average for the period 2001-2010, the greatest economic damage, i.e. half of the total estimate, was caused by meteorological natural disasters. Geophysical disasters caused 22.02% of damage, hydrological disasters caused 19.56% of damage, while climatological disasters caused 13.01% of damage. In 2011 the greatest economic damage was caused by geophysical disasters, i.e. 62.90% of total damage (Table 4).

Table 4. Economic damage per type of natural disaster.

Damages (2011 US$ bn)	2011	Avg. 2001-10	%	
			2011	Avg. 2001-10
Climatological	14.23	9.10	3.89	13.01
Geophysical	230.30	24.08	62.90	22.02
Hydrological	70.72	21.39	19.32	19.56
Meteorological	50.87	54.77	13.89	50.01
Total	366.12	109.35	100.00	100.00

Source: absolute values were taken from Guha-Sapir, Vos, Below, Ponserre, 2012: 29, Table 5.

Interpretation of research results

(a) Methodology

In order to decrease economic and human loss, alongside a number of other measures and precautions, it is necessary to prepare the population to recognize natural disasters and face them. One of the aims of empirical research, whose data is interpreted in this paper, was to ascertain if and to what extent the population was informed on natural disasters and how well they were prepared for protection and self-protection.

The research in the municipality of Kanjiža was undertaken on the sample of 274 informants. The data were collected by researchers who have experience in conducting different kinds of interviews. During the interviews the researchers noted down answers. None of the informants refused to participate in the research.

The research included two groups of informants: the local population and the local authorities. The data were collected via a closed questionnaire. The choice of the quantitative approach in the collection and analysis of data has prevented a more thorough investigation of the subjective experience of the informants. This shortcoming was somewhat compensated for by the application of a focused interview, which was conducted with one of the informants who personally experienced one of the natural disasters. The open questionnaires were the basis for the talks with four representatives of the local administration.

The research was based on defining[6] a) Natural and Physical Scientific Terms (Weather, Climate, Climate change, Extreme weather events, Heat wave, Drought, Hail, Cold wave, Flash flood, Inland excess water, Landslides, Mudflow, Shallow landslide)

6 Definitions are part of a unique methodology which was a basis for the research "Risk Assessment and Preparedness in the Danube Macro-region" which was confinanced by the EU during 2013/14.

[7] and b) Disaster Management Terms (Hazard, Natural hazard, Disaster, Disaster management)[8].

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7 **Weather:** Weather is the day-to-day state of the atmosphere in a region, and its short-term (minutes to weeks) variation. Main weather patterns are sunshine, temperature, humidity, precipitation, cloudiness and wind.

Climate: The average atmospheric conditions, i.e. the average weather in a particular region over longer periods of time (usually over 30 years).

Climate change: A significant and lasting change of the average weather patterns over periods ranging from decades to millions of years.

Extreme weather events: Weather events (e.g. storms, heat waves) induced by weather conditions which are unusual, severe or unseasonal compared to the past historical observations. Severe weather phenomena can be hazardous to human life and property.

Heat wave: A heat wave is a prolonged period of excessively (abnormally) hot weather, which may be accompanied by high humidity. Typically a heat wave lasts two or more days. This severe weather phenomenon can harm populations and damage crops.

Drought: A period of abnormally dry weather long enough to cause a serious imbalance in water supply, with consequences such as losses of standing crops and shortage of water needed by people and livestock.

Hail: A form of solid precipitation which consists of balls or irregular lumps of ice measuring between 5 and 200 millimetres in diameter. Thunderstorms producing hail that reaches the ground are known as hailstorms. Hailstorms can be especially devastating to farm fields, ruining crops and damaging property.

Cold wave: A rapid fall in temperature within a 24 hour period due to an invasion of very cold air over a large area. It is an extended period of below normal (average) cold temperatures which can adversely affect human populations, livestock, wildlife, crops, properties and services.

Flash flood: A sudden and extreme, localized flood of great volume and short duration (usually less than 24 hours), which is predominantly generated by high-intensity rainfall events. Additionally, heavy rain falling on steep terrain (slopes) can weaken soil and cause mudflows, damaging homes, roads and property.

Inland excess water: A temporary water inundation that occurs in flat land areas outside a river floodplain. Its two main sources are precipitation (rain and/or melted snow) and water table rise. This redundant surface water can not flow down to lower areas due to the terrain conditions and it cannot infiltrate also into the soil due to very high groundwater levels or impermeable soils. It typically occurs in springtime and can cause significant agricultural damage.

Landslides: Rapid or slow downslope movement of soil, rock, or debris due to gravitational forces that can be triggered by heavy rainfall, rapid snow melting, etc.

Mudflow: Rapid downhill movement of wet soil and debris (usually silt or clay), made fluid by rain or melted snow and often building up great speed.

Shallow landslide: Downhill sliding of the top layer of a slope which is the soil mantle or debris (e.g. weathered bedrock). It usually happens on slopes with high permeable soils or debris on top of low permeable bottom soils or bedrock. As the top layer becomes saturated with water (typically due to an intense rainfall) and becomes heavy, it can start to slide over the bottom layer.

8 **Hazard:** The potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision and environmental resources. Hazards have a potential to lead to disasters.

Natural hazard: A naturally occurring event that can have a negative effect on people or the environment. Natural hazards include weather-related, hydrological, geological, and biological hazards (e.g. tornadoes, floods, landslides, locusts) and wildfires.

Disaster: A hazardous physical event causing widespread adverse human, material, economic or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.

Disaster management: The organization and management of resources and responsibilities to deal with the humanitarian aspects of disasters, in particular.

(b) Primary experience

In the region of the municipality of Kanjiža the majority of informants were exposed to: hail (75), extreme storms with thunder and wind (62), high temperature (59), underground waters (44), floods (31), droughts (27), extreme cold (25), etc.

In comparison with the whole sample, 16 informants (5.8%) said that they were in situations of serious disaster when people were evacuated. In 13 cases (4.7%) both informants and members of their families were evacuated.

(c) Readiness for facing natural disasters

In the majority of cases informants did not feel prepared enough for the situations of natural disasters. More than three fifths (62.00%) of informants think that they are not prepared either enough or at all. The analysis at the level of age groups shows a high degree of agreement of informants with respect to how they prepare for natural disasters. In all age groups the majority of informants' answers are in the negative section of the scale.

For the purposes of better protection from natural disasters the informants have undertaken or are planning to undertake certain measures. Over 80.0% of informants, i.e. from 81.7% to 86.5%, avoid leaving garbage in public spaces, avoid unsafe storage of flammable and explosive materials, take care of the area around the house and have put up shades on windows. A high share of informants regularly controls the state of the house/flat, i.e. 66.1% of them. From 50.0% to 58.4% of informants have installed waterproof doors and windows, air conditioning and heat insulation and have reinforced the roof.

Besides these measures, a significant number of informants regularly watches and reads the weather forecast (93.4%), has made survival stock with candles, matches, blankets, etc. (81.0%), has made stock of medicine and first aids kits (76.3%), pays special attention to babies, old people and the chronically ill during high temperatures (56.2%), etc.

(d) Sources of information

More than one half of informants (55.1%) do not know where they can learn about possible natural disasters and how they can prepare for them. When asked "Do you know if any form of local warning exists in your settlement?", informants give almost the same answers. A somewhat bigger number of informants stated that there was some sort of a warning system (51.5%).

The question "Do you know what to do in case of a disaster warning?" has also got divided answers: 48.2% of informants offered an affirmative answer, whereas 51.8% gave a negative answer.

In the case of a natural disaster in a settlement, 61.7% of informants would not know where to look for shelter.

Most informants have never been officially notified about potential dangers and measures of protection. The ones that did receive this kind of information heard it on state or commercial electronic media (radio, TV), on the local radio or TV, read it in national press, local press, different forums or presentations in schools or in the workplace. The smallest amount of information was offered to informants via electronic messages (the internet, mobile phones) and social networks. Considering the age structure of the population of the municipality, i.e. the sample, it was expected that modern means of communication would be used to a lesser extent (Diagram 5).

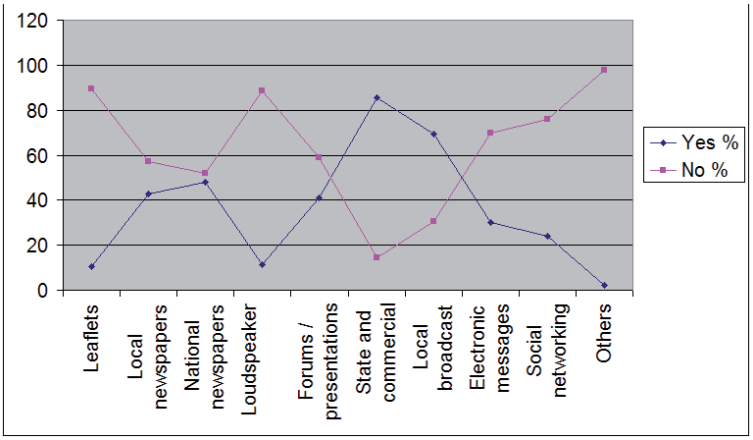

Diagram 5. Have you ever been informed about potential dangers and civil protection measures via the types of media listed below?

The analysis according to age groups shows that the youngest population is most frequently informed via state and commercial electronic media (radio and TV), then via local radio and TV, and finally in national newspapers, electronic messages and social networks. Informants aged 30-59 are primarily informed via state and commercial media (radio and TV), then via local forums and presentations, etc. The age group of informants who are 60 or more years old lists state and commercial electronic media (radio and TV) as the primary source of information, which are followed by local radio and TV and national press.

It can be noticed that with all three age groups the primary source of information are state and commercial electronic media (radio and TV), while the second most frequent source is local radio and TV.

The use of electronic messages as a source of information decreases with the age of informants. The informants who are between the ages of 18 and 29 are informed via electronic messages in 50.0% of cases; the ones who are between 30 and 59 years old in 39.0% of cases, and the ones who are 60 or more years old are informed about potential danger in this way in 7.6% of cases (Diagram 6).

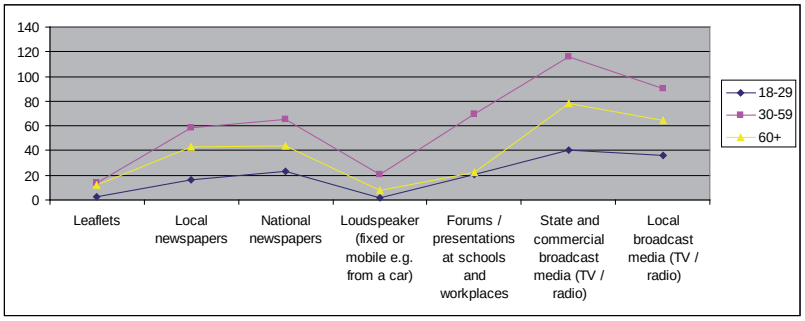

*Diagram 6. Have you ever been informed about potential dangers and civil protection measures via the types of media listed below? * Three age group*

On the basis of data concerning the level of education we can see that informants with various degrees of education are mostly acquainted with potential danger via state and commercial electronic media (radio and TV). The informants who have finished primary and secondary school get significantly more informed by local radio and TV and via national press. The informants who have a college degree are mostly informed via various forums and presentations as well as by the local media. The informants who have graduated from university put local radio and TV and electronic messages in the second place, while information received in forums or presentations and via social networks is put in the third place.

The greatest number of informants (176 of them, i.e. 71.5%) emphasize that they do not get enough information on potential natural disasters from official institutions (Diagram 7).

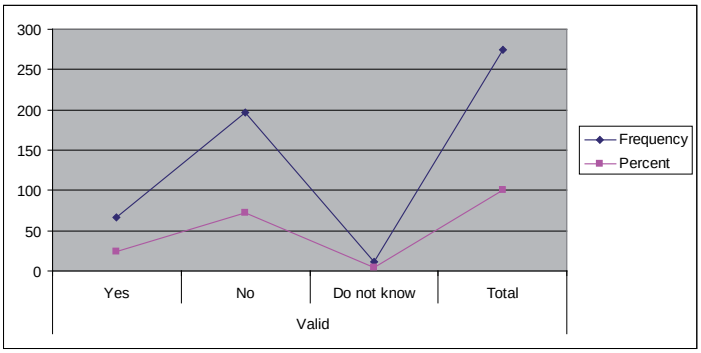

Diagram 7. Do you get enough information from official sources about the potential natural hazards and about the ways to get prepared for them?

More than four fifths of informants (82.1%) have given an affirmative answer to the question "Do you feel the need to get more information about the potential natural hazards and about the ways to get prepared for them?".

Out of 42 informants who have no need for more information on possible natural disasters 22 (16.2%) are 30-59 years old, 17 (18.5%) are 60 or more years old, while only 3 informants (6.5%) belong to the youngest age group (18-29).

The need for a greater amount of information on possible natural disasters has been analyzed at the level of educational structure. Among the people who state that they have no need for this type of information the majority have graduated from secondary school (21). The second largest group are informants with only primary education (9), who are followed by people who have graduated from college (7) and from university (4). We can notice a tendency that the higher educational degree implies a greater need for more thorough information about possible natural disasters and ways to prepare for facing with them (Table 5).

Table 5. Do you feel the need to get more information about the potential natural hazards and about the ways to get prepared for them? * The level of education

Do you feel the need of getting more information about the potential natural hazards and about the ways to get prepared for them? Without educational attainment Incomplete primary education			The level of education						Total
			Primary education	Secondary education	High education (no university degree)	Higher education (BA, BSc, MA, MSc, PhD/DLA etc.)			
	Yes	Count	0	2	44	108	49	22	225
		% within The level of education (respondent)	,0%	66,7%	83,0%	80,0%	87,5%	84,6%	82,1%
	No	Count	1	0	9	21	7	4	42
		% within The level of education (respondent)	100,0%	,0%	17,0%	15,6%	12,5%	15,4%	15,3%
	Do not know	Count	0	1	0	6	0	0	7
		% within The level of education (respondent)	,0%	33,3%	,0%	4,4%	,0%	,0%	2,6%
Total		Count	1	3	53	135	56	26	274
	% within The level of education (respondent)	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	

As far as the majority of informants know (171 of them, i.e. 62.4%), the municipality of Kanjiža has not organized a simulation of a natural disaster. An affirmative answer was given by 88 informants (32.1%). Of that number, only 38 informants say that they have participated in a simulation exercise, which is 13.9% of the entire sample. A

somewhat larger number of informants (70 of them, i.e. 25.5%) stated that an exercise would be useful.

Of the total number of informants, 97.8% think that it is very important for the local population to participate in the prevention of natural disasters. However, the majority of surveyed people (73.7%) have never participated in preventive activities. The explanation lies in the fact that many of them (88.0%) are neither members of an organization for civil protection nor volunteer firefighters (Diagram 8).

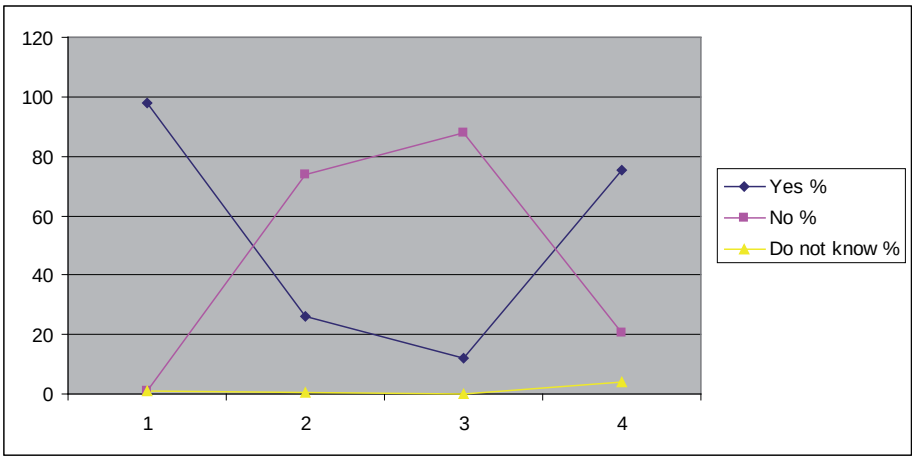

Diagram 8. Volunteering

Note:

1) Do you find it important that the local inhabitants take an active part in disaster prevention or relief actions?
2) Have you ever actively joined any disaster prevention or relief action?
3) Are you a member of any volunteer civil protection organization or the local volunteer fire brigade?
4) Are you ready to participate in relief actions in time of a real disaster situation?

The analysis of data per variable of gender indicates that the majority of both men and women think that it is important for the local population to participate in the prevention of various natural disasters. In comparison with women, men have participated to a greater extent in disaster prevention or relief actions. Of the total number of male informants, 31.3% have given an affirmative answer to the question, while the share of women who have given an affirmative answer is somewhat smaller

(22.9%). Men participate to a greater extent in volunteer civil protection organizations and fire brigades. They are also more ready to become involved in the situations of real natural disasters.

The informants of all age groups think that it is very important for local population to actively participate in the prevention of natural disasters. The share of affirmative answers ranges from 93.5% (18-29 years old) to 100.0% (60 years and older).

Over one fifth of informants aged 18-29 and 30-59 have actively participated in the prevention of natural disasters. In comparison with them, almost one third (32.6%) of the oldest informants have this kind of experience.

When it comes to the participation in volunteer organizations there are no significant differences among these three age groups.

As participants grow older, their readiness for active participation in the situations of real natural disasters also decreases. The majority of affirmative answers (84.8%) was noted in the age group 18-29 and the smallest number of affirmative answers was noted in the age group of 60 or more years of age (64.1%).

In all educational groups there is a high portion of informants who think that local population should actively participate in the prevention of disasters. In the question concerning active participation in the prevention of natural disasters we singled out the answers of those people who have not finished their primary school. One third of these informants (33.3%) have such kind of experience, which is more than in other educational levels.

In comparison with others, people who have a college degree show more presence in volunteer civil protection organizations and volunteer fire brigades as more than one fifth (21.4%) of these informants are members of such organizations.

The readiness to participate in the situations of real natural disasters continually grows with the level of education. This question was answered affirmatively by one third (33.3%) of informants with unfinished primary school and 96.2% of informants who have graduated from university.

Conclusion

Briefly, the research has led to the following conclusions:

- The majority of informants in the municipality of Kanjiža (272 out of 274) are acquainted with climatic changes.
- The informants learn least about potential dangers and measures of protection via official institutions. Similar to finding out about climatic changes in general, the most significant sources of information are radio and TV at the state and local levels.

- A large number of informants (59.9%) think that climatic changes affect daily life in the settlement. The number of affirmative answers increases with age. Climatic changes are more noticed by women than by men.
- In the region of the municipality of Kanjiža the majority of informants were exposed to: hail (75), extreme storms with thunder and wind (62), high temperatures (59), underground waters (44), floods (31), droughts (27), severe colds (25), etc. Other natural disasters were listed by 0-18 informants. We suppose that the most significant natural disasters for informants are hail, extreme storms with thunder and strong wind, and underground waters, i.e. natural disasters which caused greatest losses to their families.
- A smaller number of informants (16 of them, i.e. 5.8%) have experienced a natural disaster which required evacuation.
- The majority of informants (62.0%) think that they are not at all prepared or that they are very little prepared for the situations of natural disasters.
- In order to attain better protection, the informants have undertaken or are planning to undertake certain measures: they avoid leaving garbage in public places, they avoid unsecure storage of flammable and explosive material, they take care of the area are around the house, they put up shades on windows, they conduct regular control of the state of the house/flat, they install waterproof doors and windows, they install air conditioning and heat insulation, they reinforce roofs.
- More than half of informants (55.1%) do not know where to get information on possible natural disasters and ways to prepare for them. In case of warnings of natural disasters, 51.8% of informants would not know what to do. An even larger portion of informants (61.7%) do not know where the shelter is located or if it even exists in the settlement.

On the basis of these conclusions and in order to decrease the risk of natural disasters special attention should be devoted to the following:

- education for protection and self-protection
- continuous learning in primary and secondary schools
- organizing public seminars with specific instructions on self-protection and the protection of property
- public courses on risk management
- disaster simulation exercises
- relevant municipal services should draw up a programme of seminars and exercises.

The preparation of a risk scenario should be handled along the guidelines presented by the UN Special Representative of the Secretary-General for Disaster Risk Reduction Margareta Wahlström: "Clearly, overall risk mitigation and preparedness planning for critical and vulnerable core socio-economic infrastructure must be given higher priority".

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