

## **DAMAGES CAUSED BY NATURAL DISASTERS**

During the seventies, about 700,000 people lost their lives in natural disasters. It is estimated that nowadays that number, on average, ranges around 99,820 casualties per year, that is, around 1,000,000 casualties per decade.

According to the statistical data on the registered natural disasters, in the period 2004 - 2013 an average of 384 disasters per year were registered in the world, of which 32 were climate-related disasters (droughts and forest fires), 33 were geophysical disasters (earthquakes, tsunamis, landslides and volcanoes), 192 were hydrological disasters (floods, landslides triggered by hydrological factors), and 127 were meteorological disasters (weather disasters, heat waves and cold waves). As it can be noticed, the percentage of atmospheric and hydrological disasters in the total number of natural disasters is as high as 92%. Natural disasters are most frequent in Asia (on average around 156 per year), followed by America (on average around 91 per year), Africa (on average around 69 per year), Europe (on average around 54 per year) and Oceania (on average around 14 per year). Hydrological disasters represent the highest percentage of the total number of natural disasters registered yearly on the global level (around 50% of the total number), followed by meteorological disasters (33%), geophysical disasters (8.5%) and climate disasters (8.3%). The most common natural disasters in Europe are meteorological disasters (52% of the total number), followed by hydrological disasters (37%), climate disasters (7.4%) and geophysical disasters (3.7%). In Europe, atmospheric and hydrological disasters constitute 96% of the total number of natural disasters, which is above the global level. The average annual material damage caused by natural disasters during the last decade reached around 162 billion US dollars, while in the same period in Europe, the annual damage averagely ranged around 13.5 billion US dollars. The annual damage registered in the period 2004-2013 is three times the damage registered during the seventies. The damage caused by atmospheric and hydrological disasters constitute as high as 85% of the total damage in Europe, which is significantly higher compared to the global level, where such damage constitutes around 70% of the total damage. The most severe damages in Europe are caused by hydrological disasters (averagely around 5.19 billion US dollars per year), followed by meteorological disasters (averagely around 4.52 billion US dollars per year), geophysical disasters (averagely around 2 billion US dollars per year), and climate disasters (averagely around 1.74 billion US dollars per year).

These figures undoubtedly point to the significance of the role of a hydrometeorological system of early warning and alert in the system of preventive protection and mitigation of the impacts of natural disasters.

## Damage in Serbia

In order to better understand the extent of damage caused by extreme natural events and disasters in Serbia, it is necessary to identify the economic sectors dependent on the weather and climate. These are the sectors whose activities depend on the weather, and at the same time give a large contribution to the Gross National Income (GNI).

In the study titled "Study on Economic Benefits of RHMS of Serbia" (The World Bank Study Group, 2005, Belgrade, Serbia) the weather-dependent economic sectors in Serbia and their share in the GNI (without VAT) were identified, and the mean annual economic losses caused by hydrometeorological hazards<sup>1</sup> and unfavourable<sup>2</sup> hydrometeorological events were registered and estimated.

In the period from 2000 to 2004 the share of the weather-dependent sectors in the Gross National Income of Serbia, without Kosovo and Metohija, at 2002 constant prices excluding VAT ranged from 42% to 43.8%. Already in 2005 the share of the weather-dependent sectors in the GNI of Serbia was 47.18%. The World Bank study included only 49% of the weather-dependent sectors.

The study has shown that the sensitivity of weather-dependent economic sectors to hydrometeorological hazards<sup>1</sup> and unfavourable<sup>2</sup> hydrometeorological conditions ranges from medium to high. Table 1 shows an overview of the sensitivity of weather-dependent economic sectors in Serbia.

Table 1: Sensitivity of weather-dependent economic sectors in Serbia

Sectors exposed to risks	Phenomena	Sensitivity
Agriculture	Hail, strong wind, floods, droughts, late/early frosts, forest fires	High
Production, transmission and distribution of electricity and heating energy	Extremely low or high air temperature, heavy and long-lasting precipitation, particularly freezing rain or wet snow, lightning processes, drought, forest fires	Relatively high
Transport (road, rail, river and air)	Fog, heavy rain, snow, glaze, freezing rain, ice on the rivers, forest fires	Medium (but high for air traffic)
Civil engineering (road and bridge construction, river and lake engineering, building construction, etc.)	Strong wind and wind gusts, heavy precipitation, frost, lightning discharge	Relatively low
Water management	Droughts and floods	Relatively high
Tourism and trade	Each anomaly in relation to normal climatological cycle or weather	Medium

The estimated damage in the weather-dependent sectors is shown in Table 2. The assessment was conducted on only 49% of all weather dependent economic sectors. Undoubtedly Serbian economy suffers significant losses in material goods as well as that severe atmospheric events at the territory of Serbia cause human losses. In the study, human lives were treated as a moral norm, not as a statistical -economic category.

Table 2: Estimated damage in weather dependent economy sectors and human losses

Sectors/hazardous and unfavorable hydro-meteorological events	Evaluated losses in selected sectors	
	The mean annual economic losses in million DINARS	The mean annual human losses
Agriculture-Flood	from 3100 to 8500	Few up to 10
Water resources management-Flood	Around 1960	-----
Agriculture-Hail, Heavy rain, strong wind	Around 7316	Few up to 10 thunder-struck
Agriculture-droughts	Around 40000	No losses
Energy production (heating plants)-Extremes low air temperatures	Around 716	Few, up to 10
Road maintenance- Snow, Slippery conditions (glaze, freezing, ice.)	Around 3500	-----
Human losses on highways, regional roads and local roads due to bad weather: from 105 to 131		
Commercial air transport	From 54 to 72	-----
TOTAL	from 16648 to 48572	From few up to 160
Source: Study on Economic Benefits of RHMS of Serbia”, The World Bank Study Group, 2005, Belgrade, Serbia, p. 28-29.		

The devastating floods that Serbia observed in May 2014, caused enormous damage, which according to the "Recovery needs assessment after floods and landslides which occurred at the end of May 2014" carried out by the Government of the Republic of Serbia, amounted to 1.525 million of euros for 24 affected municipalities, whereas the overall effect taking into account other municipalities, reached 1.7 billion euros.

In view of the individual sectors of economic and social activities, the most affected sectors were the following: mining and energy sectors (damage amounting to app. 494 million of euros, or share in the total count of 32%), followed by habitation (damage amounting to 231 million euros, share in the total count of 15%), agriculture (damage of 228 million euros, or share in the total count of 15%), trade (damage of 225 million euros, and a share in the total count of 15%), and transport (damage of 167 million euros, and a share in the total count of 11%).

Due to the devastating floods in Serbia in May 2014, approximately 32 000 people were temporarily evacuated from their homes, out of which 25 000 residents of the City of Obrenovac. During this natural disaster, 51 people lost their lives.

Estimated damage in weather-dependent economy sectors, including human casualties, in particular consequences of the catastrophic floods from 2014, clearly indicate the necessity for further technical-technological improvement of the hydrometeorological system for alert and warning. In this way we contribute to the strengthening of resilience\* and capacity\*\* of the entire social community in Serbia.

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<sup>1</sup> *Hydrometeorological hazards relate to hydrometeorological events, which by their intensity, duration or time of occurrence pose risks to human safety and may inflict a substantial damage on the economic sectors. These phenomena are viewed as hazardous when they reach critical values or characteristics of hydrometeorological values. [Source: "Study on Economic Benefits of RHMS of Serbia", The World Bank Study Group, 2005, Belgrade, Serbia]*

<sup>2</sup> *Unfavourable hydrometeorological events (weather conditions) refer to hydrometeorological events, which by their intensity, duration or time of occurrence do not reach critical values or characteristics of hydrometeorological values, but which may inflict damage to specific weather-dependent economic sectors. [Source: "Study on Economic Benefits of RHMS of Serbia", The World Bank Study Group, 2005, Belgrade, Serbia]*

\* *Resilience: Capacity to recover the normal functioning and development after being hit by a disaster. High resilience reduces the indirect impacts of disasters, such as business and services interruptions in the aftermath of a disaster. [Source: ISDR (International Strategy for Disaster Reduction) Terminology of disaster risk reduction]*

\*\* *Capacity: A combination of all the strengths and resources available within a community, society or organization that can reduce the level of risk, or the effects of a disaster. [Source: ISDR (International Strategy for Disaster Reduction) Terminology of disaster risk reduction]*