

6. Social and economic impacts of drought and inland excess water in Vojvodina/Serbia

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Introduction

The analysis of numerical data reveals that the number of natural disasters has increased significantly. While only 354 natural disasters were recorded between 2007 and 2016, their number reached 335 in 2017 alone (CRED 2018). At global level the following natural disasters occur most frequently: floods, storms, earthquakes, extreme temperatures, landslides, droughts, fires, volcanic activities and mass movements (dry). According to the source mentioned above, drought represented 4.8% of natural disasters between 1998 and 2017, which ranked this phenomenon the 6th most frequent among natural disasters. Drought occurs much less frequently than storm or flood, but the number of people suffering from its impact is high. For instance 126 floods put 55 million people at risk in 2017, at the same time 7 droughts had an adverse effect on the lives of 10 million people. Estimates of economic loss data reveal more and more severe consequences of droughts. Between 2007 and 2016 droughts caused USD 7.8 trillion worth of economic loss in the world. In 2017 alone the level of economic loss reached USD 2.4 trillion.

Unlike other natural disasters, drought develops slowly and lasts for a long time. The consequences of drought depend not only on its intensity, but also on the level of economic development in the given country. Developed countries are able to mitigate the effects of drought – it is easier for them to cope with the problem. For poor countries drought is often a matter of life and death. They don't have the financial resources that would make it possible for them to mitigate the effects of drought on people and on the economy.

In the Republic of Serbia droughts occur in the North East, the East and the South (Regulation on the national register of environmental indicators, 2011). In comparison with the global mean temperature, the temperature increase is faster in Serbia. Expectedly the mean temperature in Serbia will be 6°C higher at the end of the 21st century, while the global mean temperature will grow by 4.5°C (Vuković, 2006). Consequently this will increase the frequency of droughts and strengthen its negative effects.

In addition to drought, inland excess water also has a negative influence on social development. Inland excess water is accumulated due to two phenomena: rain and/

or melted snow and rising ground water levels. Inland excess water formation is the most frequent in the spring, and just like drought, these waters cause serious damage in agriculture. With a degree of organisation and the necessary technological background, inland excess waters can be used for preventing the negative impact of drought. Unfortunately the level of inland excess water utilisation is rather low at the moment. Between 2007 and 2013 inland excess water's share from total water utilisation was only 12.0-14.0%, and only a little proportion was used for irrigation purposes. (Total water utilisation data for the 2007-2013 period [with the exception of water utilised for hydropower generation]).

Empirical research data indicate that the population feels the effects of climate change and natural disasters at three levels: individual / family, municipality and the society as a whole (Vuksanović and Nagy, 2017).

- At the level of individuals some of the most important consequences are health complaints and the feeling of economic insecurity.
- Representatives of the local authorities call attention to the problems that municipalities need to face: deterioration in the quality of infrastructure, lower yield, the population getting poorer and more people ending up in a socially disadvantageous position.
- As for the whole of the society, the economic, social, demographic and environmental problems caused by natural disasters can be identified.

Factors influencing the social and economic consequences of natural disasters

Factors that have an impact on the social and economic consequences of natural disasters can be grouped into three categories: social and demographic characteristics of the population; awareness of climate change and natural disaster issues; educating the population about climate change and natural disasters.

Social and demographic characteristics of the population

As a result of the national level unpreparedness, the municipalities are unable to adapt to the situation. The effects of drought and inland excess water aren't only direct financial damages and human lives lost, but also indirect consequences such as the problems in agricultural production and the depopulation of villages. The social and demographic characteristics of Serbian towns and villages make it difficult to cope with natural disasters. These are the most palpable difficulties (Vuksanović and Nađ, 2017):

- Depopulation of villages and the aging of those who stay there. For instance in Sečanj 30% of the population were of old age at the time of the 2005 flood (Vuksanović, 2011).
- Leaving village communities behind and people moving to urban communities.
- High proportion of the population needing healthcare treatment.
- High proportion of the population living with physical disabilities. During the flood there were 60 physically disabled people living in Sečanj (Vuksanović, 2011).
- Underdeveloped infrastructure (run-down roads or the lack of roads; the lack of plumbing and sewerage system or these systems being obsolete...).
- No investment in the existing infrastructure.
- Certain institutions are forced to close because of the depopulation process – the first to do so are usually educational and cultural institutions.
- Due to the closure of educational and cultural institutions, the chances for educating the already small population reduce.
- Because of these changes the human factor becomes problematic when a disaster occurs. The human potential narrows down to the small number of medium- and old-age inhabitants.
- Uncultivated lands increase the danger of fire.
- Equipment that can be used in case of a natural disaster becomes obsolete; the machines aren't maintained and lose their functions.
- Due to the lack of maintenance flats and houses deteriorate, and they become more vulnerable to natural disasters.
- The bad financial situation of most households influences 'the speed at which a town or village reacts to mitigate the negative effects of a natural disaster...'

Awareness of climate change and natural disaster issues

Having adequate information makes it possible to prepare in time, to reduce financial and human loss, and to evacuate the properties of the inhabitants. Without preparing in advance, the chances are bigger for losses and the stress level increases too.

According to a survey conducted in Kanjiža, the majority of respondents (71.5%) reckon that they don't receive enough information from the authorities about potential natural disasters. More than half (55.1%) said they don't know where they can get information about possible natural disasters and how to prepare for them (Vuksanović and Nađ, 2017).

Educating the population about climate change and natural disasters

In Serbia people aren't provided with information about climate change and natural disasters, or they only receive information via volunteer groups, such as the activities of the fire brigade. According to a member of the municipal council in Kanjiža who is responsible for emergencies, the population of the town learn what they must do in case of emergency 'from the members of the volunteer fire brigades. These associations have 220 members in total, who are very well trained for performing protective and rescue tasks' (Vuksanović and Nađ, 2017).

The director of the School of Agriculture in Kanjiža opines that even if there was some kind of information providing by the relevant authorities, the population wouldn't accept it: 'The Ministry for Environmental Protection had sent us a brochure which we distributed among the students, so that they would take it home and show it to their parents. This brochure contains the description of various types of emergencies and their potential threats to the population. The phone numbers people should call in such situations are also included. Well, the students took the brochures home, but their parents weren't interested in it at all. All they want to know about during the regular parent-teacher consultation is their children's progress.'

It also shows how little people care about the work done by organisations active at the time of natural disasters that 73.7 percent of respondents have never participated in preventive work before, and 88.0 percent of people aren't members of either civil protection organisations or volunteer fire brigades (Vuksanović and Nađ, 2017).

Besides the individuals being uninterested, the same survey revealed that 62.0% percent of respondents were of the opinion that they weren't prepared enough or fully for the situation of a natural disaster, and 33.2% said they were completely unprepared.

In Kanjiža the population is provided with information about what to do when a natural disaster occurs when they study in primary and secondary schools, but the plan is to involve pre-school institutions too. Fire emergency practices are organised in schools. 'It is very important to teach the students about the potential risks of fire, because they can be very dangerous at the times of drought. A burning cigarette thrown away on purpose can cause a catastrophe. Drought is an extraordinary situation, just like the spring periods when the rainfall is above the average. Thanks to the dikes the river itself isn't a threat to us, but inland excess waters did accumulate in the fields, due to the rising of the groundwater level. People are doing construction work to stop the river, but the water must flow somewhere and if this can't happen naturally, it will spring to the surface in the towns and in the fields' – informed the director of the School of Agriculture in Kanjiža.

Consciousness about climate change

Various types of media and their contents disseminate knowledge about climate change and its consequences: 'As regards global climate change and the reasons behind it, almost everyone has some kind of information because there are several popular science programmes on television that discuss the topic. However, my personal experience is that people think about climate change as it was some kind of distant and abstract thing. Many people think that their lifestyle doesn't influence the general processes – and this definitely isn't the right attitude in the long run' – told a civil society member (Vuksanović and Nađ, 2017).

According to the research mentioned above, women feel the effects of climate change in everyday life much more than men, the elderly or young people.

It is possible that due to the lack of knowledge about the possible disaster, there will be complete unpreparedness and chaos when it occurs. If evacuation will have to be performed, it will only mean rescuing the inhabitants.

Economic consequences of a potential climate change

Recent surveys (WAHASTRAT¹) have studied what the population thinks about drought as a natural disaster, why it occurs, what its consequences are (*the consequences are becoming stronger, ranking of the most important measures that need to be taken to mitigate the effects of drought, managing the problems caused by the drought*), how the drought influences the lives of locals, what kind of influence it has on agricultural production, and to what extent the current structure of agricultural production can be retained.

Research on inland excess water (MERIEXWA²) analyses the significance of climate change from the perspective of inland excess water accumulation; what do the population think about the consequences of floods and inland excess waters, and what kind of solution they expect (how to overcome the difficulties, what steps to take).

Research on Climate Change – Economy – Society includes:

- The opinion of the population (climate change compared with other problems of the society, who should participate in solving the problem of climate change)
- Noticing climate change (recognising the phenomenon);
- Contributing (financially) to solving the problems caused by climate change
- People's attitude towards climate change (Czifrusz et al. 2015).

1 Water shortage hazard and adaptive water management strategies in the Hungarian-Serbian cross-border region

2 Measurement, monitoring, management and risk assessment of inland excess water in South East Hungary and North Serbia

Drought and inland excess water have serious consequences in agriculture. The more severe the drought is and the less inland excess water utilised, the more negative the effect they have on agricultural production.

Whether the adverse effects of drought manifest in agricultural production or not depends on: soil characteristics, groundwater level, lack of precipitation, crops grown, temperature, soil cultivation, etc. If we compare the high yielding year of 1991 and the drought-ridden year of 2003, we can see the differences in yield, crop value and loss (Table 6.1).

Table 6.1 Annual losses and crop yield in Vojvodina

Crops	Yield (t/ha)		Production value (thousand USD)		Production loss (thousand USD)
	1991	2003	1991	2003	
Wheat	4,5	2,2	351.000	171.600	179.400
Corn	5,9	3,2	757.030	384.930	372.100
Sunflower	2,2	1,8	59.400	48.600	10.800
Soy	2,6	1,7	93.236	60.960	32.276
Sugar beet	44,9	27,0	60.615	36.450	24.165
TOTAL			1.323.272	704.543	618.741

Source: Jaroslav Černi Water Management Institute, Water Supply Institute, Serbian Water Resources Directorate, 2009.

Unfortunately it isn't only the quantity and quality of crops grown that suffer from the impacts of drought and inland excess water. E-magazine *Agroklub* published articles on drought in 2015, 2016, 2017 and 2018, and an analysis of these reveals a series of social consequences caused by this type of natural disaster. The conclusions are based on the experiences of farmers and agricultural cooperatives, and on various estimates.

Data is scarce on the social and economic consequences of inland excess water. To put it briefly, there are no systematic and interdisciplinary scientific research results available.

When studying the social consequences of drought, it must be taken into account that its effects are magnified by related phenomena such as hailstorm and extremely strong wind. Some of the most important consequences can be:

- Decreasing yields, lower crop quality (reducing nutritional value)
- Young crops desiccate on newly utilised arable land, leaves and shoots desiccate on farmland used for a longer time
- Drought in July and August affects the bud formation of fruit trees
- Various crop diseases occur

- Deterioration in the quantity and quality of silage
- Poor quality of grazing land
- Decreasing quantity of animal feed causes problems in the feeding and breeding of livestock
- The price of produce increases due to the reduced availability
- More expensive produce entails smaller purchasing power for the poorer members of society
- There are more fires at the time of drought
- Because of the instability in production and the frequency of losses, many people quit farming or the size of cultivated land and livestock decreases.

Taking into consideration that we must face the problems of drought and inland excess water on a permanent basis, our task is to start programmes that make it possible to prevent the negative consequences of drought or at least to mitigate them, utilising inland excess waters when there is drought.