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## Proceedings



*Editor*

*Prof. Dr Snežana Šerbula*

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## CITIZEN PARTICIPATION OFFERS LESSONS TO CLIMATE CHANGE MANAGEMENT

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### Abstract

*The paper presents some lessons learned from the view and experience of the local population on climate change impacts. A survey among the rural population in Serbia measured their awareness, impact of climate change, and actions applied against it. The results indicated that respondents recognize the role of human activities in climate change; TV and the internet are primary information sources; the distinction between adaptation and mitigation is unclear; whereas droughts, floods, and hail are the most frequent manifestations of climate change in rural Serbia. In conclusion, further awareness of climate change details should be channeled through TV and the internet as the most popular sources of information, especially regarding the unclear difference between adaptation and mitigation. Future financial measures should address repairmen of the damages caused by the most common issues.*

**Keywords:** climate change, spatial planning, survey, participative approach, Serbia

### INTRODUCTION

It was the end of the 19<sup>th</sup> century when Svante Arrhenius, a Swedish researcher, brought up the idea that the use of fossil fuels adds CO<sub>2</sub> to the atmosphere thus altering some parameters of climate conditions [1]. In the 1950s researchers started to test the hypothesis with technically improved methods [2] when monitoring showed a constant rising in CO<sub>2</sub> concentration and temperature [3].

In 1988, the World Meteorological Organization established the Intergovernmental Panel on Climate Change (IPCC) for following climate change trends and scientific research. Since then, it is vigorously involved in the preparation of climate change assessment reports to keep up a transparent insight for the governments worldwide. Following IPCC efforts, the United Nations proclaimed “urgent action to combat climate change and its impacts” as one of the sustainable development goals in 2015 [3]. To show awareness of climate change issues and put solutions into practice, 175 parties adopted the Paris Agreement at the Conference of Parties (COP21) in Paris in 2015 [3].

According to the latest IPCC report [4], Serbia records, similarly to other European countries, a decrease in the number of cold days and nights and an increase in the number of warm days and nights. The most extreme increase in hot weather events is expected in central and south-eastern Europe, where Serbia is located. This is associated with the increased expectance of drought [5], which will probably increase the mortality and morbidity of

populations [4]. The Second Report of the Republic of Serbia towards the UN Framework Convention on Climate Change – Climate Change Chapter Summary [6] states that the future will most likely bring an increase in precipitation until 2040, followed by a decrease. The estimations and general agreement address these changes as very likely the consequences of human activity that doubles the occurrence probability [4].

In the past decades, the involvement of the local population and other stakeholders has become a requirement [7]. A wide range of authors confirms the necessity of the participatory approach and collaboration with stakeholders to holistically address climate change challenges [8,9]. Acquaintance with local observations and traditional knowledge secures more efficient measures [8].

The climate change impact in urban areas is larger as a greater number of people is exposed, where the damage on public infra- and suprastructure or private property can be repaired. In contrast, the majority of the rural population is disadvantaged both by damaged infrastructure, buildings, and also crops that are the main source of the rural economy [10]. Their crops rely on the availability of rainwater, whereas droughts, floods, and fires harm crop productivity [5,11], causing soil salinization in drier areas [10], fluctuation of livestock [5], and ultimately the overall rural economy. This makes rural communities particularly vulnerable [4,10,11]. Additionally, the rural population is usually exposed to a higher level of poverty, remoteness, and information accessibility, and is frequently left out of the decision-making process [4].

## **MATERIALS AND METHODS**

The main research question is: what can be learned from the citizens' perspective on climate change. Assuming that insight into citizens' views on and experiences with climate change indicate messages that can be integrated into climate change management, an individual perspective (usually easily omitted) was analyzed. The data was collected in a survey filled out by 37 persons as representatives of their households in rural areas. A criterion for respondents was to inhabit rural areas or hold an actively used agricultural plot. The respondents came from villages in Arandelovac, Arilje, Brđani, Brus, Čačak, Gornji Milanovac, Kraljevo, Krupanj, Lajkovac, Loznica, Ljubovija, Nova Varoš, Obrenovac, Prijepolje, Raška, Smederevo, Smederevska Palanka, Sopot, Topola, Užice, and Valjevo local administrative units.

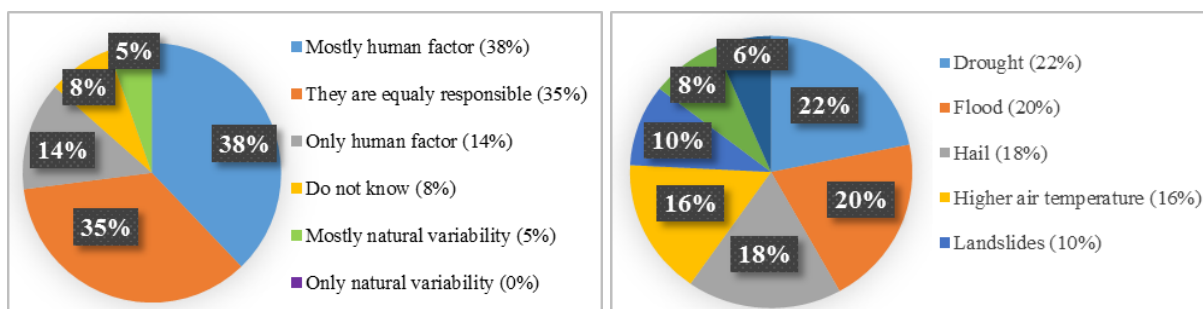
The survey was conducted between 14<sup>th</sup> August and 12<sup>th</sup> September 2018. Means of questionnaire dissemination and collection of answers were the internet and telephone. The questionnaire included thirteen questions divided into four sections. The first section offered questions on personal attitudes and experiences regarding climate change understanding, occurrence, and consequences (five questions). The second section was about climate change measures (three questions), third was focused on sources of information and knowledge on climate change (two questions). Finally, the fourth section was oriented toward future actions (three questions). All were multiple-choice questions, except for questions about measures, which were open-ended questions.

## RESULTS AND DISCUSSION

Some authors criticize the focus on CO<sub>2</sub> reduction and advocate other GHG (e.g. water vapor) as more significant for climate change mitigation [12]. However, the sample analyzed here has shown a strong inclination towards the mainstream attitude and complies with a vast of scientific sources (e.g. [13,14]) and efforts of the IPCC.

More than half of respondents (54%) believe that the human factor has an impact on climate change to a certain extent. The second-largest group (40%) is more convinced by accepting the impact without a doubt. Only 3% stated that they do not know and another 3% does not agree to a certain extent, while no respondent disagreed.

The majority of the citizens think that the human factor has a stronger impact than natural events or that the human factor equally causes climate change as natural variability (Figure 1). In contrast, no respondent expressed that natural processes are the only factor for climate change. The greatest share of citizens reported drought and flood as a result of extreme weather conditions and the most common problem related to climate change. Landslides appear to be rather location-specific and dependent on the type of soil and geomorphology of the terrain. Interestingly, only a few respondents noted premature snow melting as a noticeable issue.

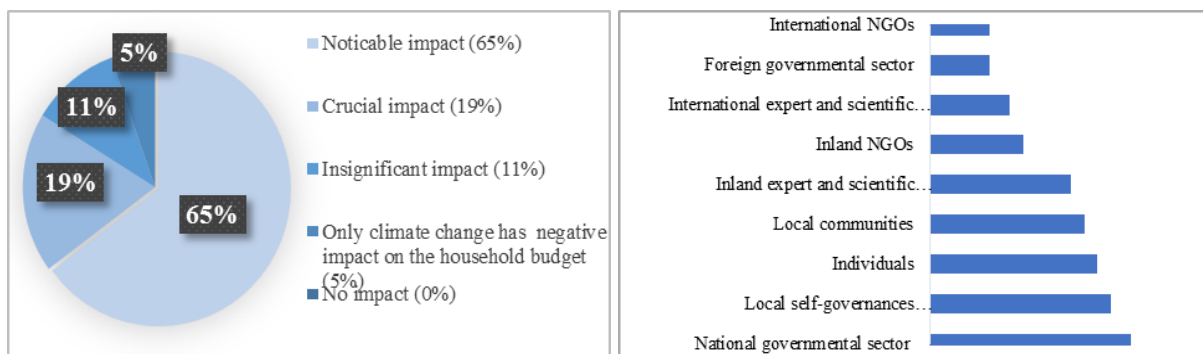


*Figure 1 Responsibility factors and the most common climate change impacts*

Similarly, the citizens selected floods and then drought and hail as the main problems in the climate change domain. More than a half fewer citizens are stressed by higher air temperature, landslides, and weather extremes, thus leaving premature snow melting as the least significant impact on their households. Some of the IPCC reports also stress the particular issue of water [15], which is the issue on which respondents of the survey comply. For the majority of respondents, the least influential impact comes from the premature melting of snow. This concern is in contrast to the efforts of Alpine countries to socio-economically adapt to climate change – looking for a solution to prevent avalanches or prolong the skiing season [16]. The reason behind this might be the fact that the majority of households in rural Serbia still prevalently depend on agriculture instead of tourism. Therefore, they do not notice premature snow melting as a particular threat to their economy or health.

When estimating material damage to households caused by climate change in the last five years, a significant majority of the respondents indicated that the consequences are noticeable (Figure 2). The share of respondents decreases with the decrease of impact.

The respondents were asked how they inform themselves about climate change mitigation and adaptation measures. The most significant sources turned out to be TV (78%), internet (70%), and daily newspapers (41%). About 1/3 of respondents get informed from communicating with their neighbors and friends (32%). Respondents who inform themselves from only one source are informed on the Internet (16%). Besides, a bit more than a fifth of the citizens (22%) rely on more than three sources to get informed about climate change. Radio (16%), locally organized seminars (11%), and the formal education system (11%) were not reported as significant sources of information. As expected, professional/scientific conferences have shown to be the least relevant (3%). Citizens indicated that professional organizations (43%) are considered the most relevant in their informativeness on climate change. Certain relevance was given to scientific organizations (22%) and local self-government (19%). An insignificant role was given to the state government activities (8%) and international non-governmental organizations (NGOs) (5%), whereas the least relevant are national and local NGOs (3%).



**Figure 2** Climate change impact on the household budget and the leading stakeholders in combating climate change

In the eyes of the respondents, the national governmental sector (81%), local self-governance (73%), and individual actions and behavior (68%) are the top leaders in the future combat climate change (Figure 2). In contrast, foreign bodies (international NGOs and foreign governmental sector) are seen as the least relevant. Regarding agility to engage themselves in the activities for climate change prevention, about half of the respondents (51%) stated that they are ready to get engaged but not as initiators. About one-fourth expressed a strong possibility for engagement (24%) and 14% are even ready to initiate an action. No citizen declined potential participation, although 5% stated that they most probably would not find themselves engaged.

The citizens were asked about adaptation and mitigation measures in two separate questions, but it was obvious from their answers that they did not make a clear distinction. Therefore, their answers were analyzed without insisting on the difference. The lowest share of respondents (3%) listed measures such as reparation of buildings after a flood, use of nets against the sun, rising awareness of environmental protection and active engagement (e.g. reduction of GHG), plans for the case of flooding/draught, and crops and harvest insurance for registered agricultural holdings. On the one hand, 8% of respondents stated that there is no

measure of climate change protection and adaptation in their municipality/city, while another 8% listed some sort of phyto-measures (e.g. specific crop distribution, the specific timing of sowing, and cropping). Between 10% and 20% of citizens listed afforestation, forest-cutting control, and landslide recovery. The most significant number of responses addressed water regulation measures on agricultural land (22%), and some sort of river bed regulation (41%).

Out of all listed measures, the anti-hail system and regulation of river bed is the most common answer when it comes to the adaptation and mitigation measures that the citizens are aware of as implemented measures in their community. Among water regulation measures on agricultural land, respondents listed drainage (25%), channels (25%), and irrigation (75%). Those who addressed anti-hail measures mainly referred to state anti-hail stations (80%), while the smallest portion addressed private systems such as anti-hail netting of orchards or vegetable plantations (21%). A quarter of correspondents also underlined that anti-hail stations exist, but they do not function properly or they are not in operation due to the lack of staff or equipment.

## **CONCLUSION**

The most common aspect of climate change impact in rural Serbia are floods, droughts, and hail. Some of the difficulties that will remain in the future are financial support in the implementation of climate change measures and regulations that might be costly, both for governments (due to a large number of users) and citizens (that already encounter financial shortages caused by climate change). However, climate change impacts can be mitigated by the improvement of the existing spatial, sectoral (e.g. flood or heatwave risk management plans), and urban planning practices (local authorities may define climate-resilience standards for existing and future buildings, promote green and blue spaces in the local development plan and investments in technical equipment and strategic, construction, organizational, financial, and legislative adaptation and mitigation measures against hail, floods, fire, etc.

As the government is the main responsible for future activities related to climate change, TV and the Internet (recognized as the main sources of information about climate change) should be used as the main communication channels in this regard. This can also improve the weak distinction of citizens regarding climate change adaptation and mitigation measures. Support that citizens expect from local or state governments also involves financial compensation or reimbursement. Therefore, some changes in economic incentives and support should be introduced and specifically aimed at climate change consequences and unloading the financial burden of the households.

All respondents have encountered at least one of the consequences that can be related to climate change, whereas none of them has declared to be free of material damage that can be related to climate change. This indicates that the consequences of climate change are broadly present and noticeable, so efficient measures from the state and local levels are required.

## **ACKNOWLEDGEMENT**

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