EXtremeClimTwin
BUILDING EXCELLENCE IN HYDRO CLIMATE RESEARCH

University of Novi Sad | Faculty of Sciences
DEPARTMENT OF GEOGRAPHY, TOURISM AND HOTEL MANAGEMENT

INTERNATIONAL CONFERENCE on HYDRO-CLIMATE EXTREMES and SOCIETY

Abstract Book

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Novi Sad skyline during the heatwave July 2022 by Prof. Lazar Lazić

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Climate Gentrification: Valuing Perceived Climate Risks in Property Prices

Joshua Thompson[1*]

[1] Loughborough University; United Kingdom *J.Thompson@lboro.ac.uk

As physical climate hazards, such as floods and wildfires, become more severe due to climate change, they are having an increasing impact on property prices. This trend is raising concerns about financial stability for homeowners, as well as for the insurance and mortgage industries, and even broader financial systems. This research introduces a novel definition of Climate Gentrification (CG), highlighting the connection between physical climate risks, risk perception, and capital movement in property markets. After identifying the key drivers of CG, an empirical case study of a flood-prone city in the UK is presented. This study reveals a significant impact of CG on the property market, with house price growth suppressed by up to 50% in flood-exposed areas relative to unexposed areas from 2005 to 2018. The research further discusses ethical concerns around CG and identifies potential directions for future research. The findings underscore the need for a more comprehensive understanding of CG, its influence on real estate markets, and its policy implications for both the private and public sectors in the context of climate change resilience.

Influence of Hydro-climate Extremes on Microplastic Environmental Pollution: what do we Know so Far?

Ivana Mikavica[1], *Dragana Ranđelović*[1], *Aleksandar Jovanović*[1], *Jelena Mutić*[2]

[1] Institute for Technology of Nuclear and other Minerals Raw materials, Belgrade, Serbia; *i.mikavica@itnms.ac.rs

[2] University of Belgrade-Faculty of Chemistry, Belgrade, Serbia

Ecosystems, human health, and energy are severely endangered by hydro-climate extremes, which intensity, duration, and frequency have significantly increased over the past decades. Additional hazards may occur by climate change's linkage with other environmental issues. Microplastics (MPs) originate from plastic defragmentation during chemical, physical, and biological processes. Owing to its ubiquity in terrestrial, freshwater, air, and marine environments, MPs pollution has become a global environmental concern. Growing evidence of microplastics' negative effects on soil and water properties, and organisms populating those habitats have been gradually reported. Furthermore, plastic debris production directly contributes to greenhouse gas (GHG) emissions and disrupts ecosystems' ability for climate regulation by influencing various ecosystem processes and services. The mobility, transfer rate, and effect of microplastics in environmental mediums depend on the microplastics' content, type, and shape. Additionally, the aging of microplastics was found to increase their adsorption capacity, leading to the increased surface area for pollutant adsorption. Accumulation of microplastics coupled with variable environmental conditions affects soil physicochemical properties. Microplastics have been found to affect the soil water regime and water-holding capacity by influencing soil porosity and aggregation. Additionally, due to the enhanced wetting and drying cycles caused by hydro-climate extremes, vertical migration of microplastics in soil tends to be increased. Corridor landscape structures and their edges, such as rivers and their riparian soils are also found prone to impacts of extreme climatic events such as flooding. It has been reported to affect the microplastic organization in the environmental compartments, whereas riparian soil served both as a source and sink for microplastics. At the same time, frequent water–soil interaction provided suitable

deposition conditions for small-sized microplastics. Flooding has the potential to further intensify plastic pollution, and flood-risk areas often become high plastic mobilization sites. Worldwide research revealed that microplastic abundance positively correlates with climatic factors such as rainfalls and winds, especially in countries with high volume and intensity of precipitation, which may influence the transport and settlement of MPs suspended in the air. MPs deposition has been found to be higher in wet periods, depending on the intensity of the occurring precipitation. Additionally, dust storms, monsoons, and other meteorological phenomena promote MPs' transboundary migration. Published literature highlights that climate change had effects on plastic pollution and enhanced fluxes in the global distribution of microplastics. Tropical storms and other extreme weather events have been found to cause the dispersal of mismanaged waste between freshwater, marine, and terrestrial environments. Additional inputs of terrestrial MPs into aquatic environments might be increased by stronger winds, while sea level rises and frequent rain events may likely release plastic debris trapped in coastal sediments. Recently, a new type of plastic material was discovered, formed during microplastics' irreversible sorption onto the parent rock after the flooding events. Microplastics-rock complexes testify to the plastic waste entering the geological cycles while inducing new potential and yet unknown ecological risks. Microplastic omnipresence as a potential hazard should be considered as a component of the climate change and hydro-climate extremes' impacts on ecosystems and the environment, on a global level. Further research is needed for a more comprehensive understanding of the aging processes, transfer routes and rates, and risk assessments of microplastic pollution under hydro-climate extremes.

Analyzing the Impact of Cold Waves in Serbia: Event Attribution

Maja Orihan[1*], *Carley E.Iles*[2]

[1] University of Novi Sad, Faculty of Sciences, Department of Geography, Tourism and Hotel Management, Novi Sad, Serbia; *orihan.maja@gmail.com

[2] CICERO Center for International Climate Research, Oslo, Norway

The winter of 2012 in Serbia was marked by heavy snowfalls and extreme cold, leading to a declaration of a state of emergency by the Government of the Republic of Serbia. Protection and rescue activities were coordinated by the National Emergency Management HQ, resulting in the rescue of 284 people and the death of 21 due to extreme cold. Approximately 1900 households and 5590 people were affected in the distant mountain villages and approach to them was possible only by helicopter. Serbia experienced cold weather and heavy snowfall from late January to early February due to arctic air moving south over the Alps. The heaviest snowfall occurred between February 3rd and 5th, with snow cover forming and occasional wind gusts causing snowstorms and blizzards. A new worsening of weather occurred between February 11th and 13th, with most places observing continuous heavy snowfall contributing to the accumulation of significant amounts of snow, with snow depths exceeding 200 cm in hilly and mountainous areas. This research investigates the 2012 cold wave in Serbia and its implications, providing insights into the variations in the occurrence and intensity of cold waves across different years. We perform an attribution analysis of the 2012 cold wave in Serbia to compare how such an event might have been if it had occurred in 1900 or the present year. Using ERA5 reanalysis data we find that the likelihood of experiencing a cold wave in 2012 was twice as high as in the current year, 2021. Additionally, the 2012 cold wave was approximately 4 degrees warmer than an event of similar probability in 1900. If a cold wave with the same return period were to happen in 2021, it would, on average, be 1 degree warmer than the one observed in 2012. These comparisons highlight the variations in the occurrence and intensity of cold waves between different years. We also