Special feature on heat: transdisciplinary approaches to climate change

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Editorial

Climate change will cause increasing heat exposure globally and the impacts can be analysed at the global, regional and local scales. The changes of various climate parameters influence not only the natural environment but also different aspects of people's health and livelihoods and the functioning of society.

The Heat Initiative, financed by the Pufendorf Institute at Lund University, aimed at creating a cross-disciplinary research platform bringing together researchers and stakeholders interested in research questions connected to the well-established scientific foundation that climate change entails increasing warm extremes. Climate change affects all aspects of society and the solutions require collaboration. As a result, the heat research programme brought together scientists from a multitude of disciplines. The initiative included the natural, engineering, medical, design, social and economic sciences with a focus on solutions to the impacts of increasing heat at the local level. Heat stress has severe effects on human society, people's health, animals and ecosystems. The main objective of the Heat Initiative was to make the platform trigger more collaborations across disciplines and gather research ideas. The vision was to develop solutions that consider a variety of aspects in order to provide a scientifically sound basis for future policy-making addressing this urgent global societal challenge. To solve the aims of the project, researchers have worked in several groups of interest: (1) Ecosystems, biodiversity and modelling of heat, (2) Housing and urban planning, (3)

Human health, (4) Migration and behaviours and (5) Socio economic vulnerability and resilience.

During the initiative, the researchers faced challenges associated with different disciplinary cultures, language and methodological approaches. Thus, the final event, called a Heat Walk, consisted of a joint walkthrough of various themed stations around Lund University campus, where problems and solutions were discussed from various perspectives. At the various stations, the Heat Walk allowed researchers, urban planners, bureaucrats and journalists to see, observe and feel, how heat and climate change is present in a city. It was found that this common experience helped to bridge disciplinary divides and enhanced the participants understanding of various perspectives. Simultaneously, the Walk aimed to raise awareness and encourage a joint discussion on climate mitigation and adaptation strategies in societal planning.

The positive feedback from the Heat Walk resulted in an invitation to contribute to this special issue, which brings in many different disciplines into the same volume with the goal of reaching a common understanding on the variety of research aspects related to increasing local heat.

The papers gathered in this issue represent several areas of interest. In the papers of Błażejczyk et al. and Kjellstrom et al., the reader will find information about projected local heat levels until the end of the twenty-first century and essential characteristics of climate and selected bioclimate indicators (UTCI, WBGT). The projected changes in climate are the basis to assess how they will influence heat stress-related mortality in Poland and loss of work hours at the global level. The paper of Asamoah et al. brings in an interesting cross-sectional study dealing with the influence of heat stress on spontaneous abortion and still-births in pregnant women in Ghana.

The possible loss in work ability is discussed in the paper of Bröde et al. The authors discuss the applicability of different heat stress metrics (UTCI, WBGT and PHS) in assessing the impact of increasing heat stress on work ability on selected cities (Dallas, New Delhi, Managua and Osaka). The assessment of hot work environments is also a topic of the paper by Gao et al. The authors concentrate not only on the validation

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of bioclimatic indices (UTCI, WGBT and DI) but also mainly on the ways of reducing heat stress when working in hot environments. One example of a transdisciplinary analysis of a hot work environment is the paper of Lundgren-Kownacki et al. related to the migrants working in the brick kiln industry in India.

Two papers deal with the influence of heat on climate perception in tropical cities. Johansson et al. present the situation in outdoor public space in Guayaquil (Equador) and Wasim Yahia et al. in Dar es Salam (Tanzania). The authors pay attention on the role of urban design and urban green space on pedestrian's perception of climate.

The second paper by Lundgren-Kownacki et al. discusses challenges associated with increasing air conditioning use in

private and public buildings but also alternative solutions at different societal levels. Some examples in the text illustrate the challenges and solutions.

The special issue does not cover all impacts and perspectives of increasing heat at the local level, e.g. aspects related to water resources, agriculture, transport, constructing works etc. The effectiveness of Heat Warning Systems as well as the functioning of healthcare and education systems and addressing other related problems should be undertaken in the future research. Nonetheless, the authors hope that it assists in improving cross-disciplinary understanding and strengthens research in finding sustainable solutions to the arising problems associated with increasing heat.

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