

Editorial

Smart Urban Governance for Climate Change Adaptation

Thomas Thaler ^{1,*}, Patrick A. Witte ², Thomas Hartmann ³ and Stan C. M. Geertman ²

¹ Institute of Mountain Risk Engineering, University of Natural Resources and Life Sciences, Austria;
E-Mail: thomas.thaler@boku.ac.at

² Department of Human Geography and Planning, Utrecht University, The Netherlands; E-Mails: p.a.witte@uu.nl (P.A.W.),
s.c.m.geertman@uu.nl (S.C.M.G.)

³ School of Spatial Planning, TU Dortmund University, Germany; E-Mail: thomas.hartmann@tu-dortmund.de

* Corresponding author

Submitted: 18 June 2021 | Published: 19 August 2021

Abstract

Climate change will affect the way cities work substantially. Flooding and urban heating are among the most tangible consequences in cities around the globe. Extreme hydro-meteorological events will likely increase in the future due to climate change. Making cities climate-resilient is therefore an urgent challenge to sustain urban living. To adapt cities to the consequences of climate change, new ideas and concepts need to be adopted. This oftentimes requires action from different stakeholder groups and citizens. In other words, climate adaptation of cities needs governance. Facilitating such urban governance for climate adaptation is thus a big and increasing challenge of urban planning. Smart tools and its embedding in smart urban governance is promising to help in this respect. To what extent can the use of digital knowledge technologies in a collaborative planning setting be instrumental in facilitating climate adaptation? This question entails visualising effects of climate adaptation interventions and facilitating dialogue between governments, businesses such as engineering companies, and citizens. The aim of this thematic issue is to explore how the application of technologies in urban planning, embedded in smart urban governance, can contribute to provide climate change adaptation. We understand smart urban governance in this context both in terms of disclosing technical expert information to the wider public, and in terms of supporting with the help of technologies the wider governance debates between the stakeholders involved. The contributions reflect this dual focus on socio-technical innovations and planning support, and therefore include various dimensions, from modelling and interacting to new modes of urban governance and political dimensions of using technologies in climate change adaptation in urban areas.

Keywords

climate change; planning; resilience; risk management; smart technologies; smart urban governance; vulnerability

Issue

This editorial is part of the issue “Smart Urban Governance for Climate Change Adaptation” edited by Thomas Thaler (University of Natural Resources and Life Sciences, Austria), Patrick Witte (Utrecht University, The Netherlands), Thomas Hartmann (TU Dortmund University, Germany) and Stan Geertman (Utrecht University, The Netherlands).

© 2021 by the authors; licensee Cogitatio (Lisbon, Portugal). This editorial is licensed under a Creative Commons Attribution 4.0 International License (CC BY).

1. Introduction

Extreme weather events, such as floods, droughts, water scarcity, or heat waves demand new responses and concepts to enable climate scientists and governments to address negative impacts of climate change on people and the environment. Extreme weather events are likely

to increase in frequency and severity (Intergovernmental Panel on Climate Change, 2018). Urban areas are likely to be affected, as they are especially vulnerable to the impacts of a warmer climate because of urbanisation pressure and aging infrastructures (Feagan et al., 2019). Therefore, urban areas need innovative ideas and answers to current and future climate-related

challenges (Andersson et al., 2021; Elmqvist et al., 2019; Ürge-Vorsatz et al., 2018). This makes climate adaptation an important task of urban planning.

Urban resilience has become already a goal for many policy makers at different levels (Meerow & Newell, 2019). Urban resilience to extreme weather events integrates social, ecological, and technological systems to provide adequate infrastructures to withstand a warmer climate (Tempels & Hartmann, 2014). This has implications for current modes of governance, decision-making processes, and a change of the current social practices of urban planning (Feagan et al., 2019). Urban planning plays a central role in attaining the goal of urban resilience (Bush & Doyon, 2019). For example, spatial planning can strengthen urban resilience in terms of influencing the urban structure.

A critical and yet understudied element in reaching the goal of urban resilience—in particular related to climate change—involves the use of technologies in planning, communication, and decision-making processes. In that, one can think of diverse technologies, ranging from websites collecting and/or providing relevant planning information (e.g., Maptionnaire) to instruments that support communication processes (e.g., Maptables) all the way to complex instruments for supporting design, modelling, and analysing activities (e.g., UrbanSim). The use of digital knowledge technologies in a collaborative governance setting promises to be instrumental in visualising effects of climate adaptation interventions and facilitating dialogue between governments, businesses such as engineering companies, and citizens. Hitherto, however, smart planning approaches have been mostly understood from a predominantly technocratic perspective (see, e.g., Hollands, 2008). In contrast, we advocate a more transformative and sociotechnical orientation, where the focus is on developing an interconnected and complex understanding of planning, which requires the use of technologies in planning processes to reach effective and efficient decisions (Jiang et al., 2020). We refer to this orientation as ‘smart urban governance.’ There are already numerous practical examples of smart urban governance that offer promising new modes of governance and methods of collaboration between decision-makers, stakeholders, and citizens. This thematic issue focuses especially on the contribution of smart urban governance for climate change adaptation. We understand this both in terms of disclosing technical expert information to the wider public, and in terms of supporting with the help of technologies the wider governance debates between the stakeholders involved.

The aim of this thematic issue is to present contributions across different disciplines that explore how technologies in urban planning (i.e., smart urban governance) can contribute to provide a robust response to extreme weather events caused by a warmer climate. The contributions reflect this dual focus on socio-technical innovations and planning support, and therefore cover vari-

ous dimensions, from modelling and interacting to new modes of urban governance and the political dimensions of using technologies to effect climate change adaptation in urban areas.

2. Overview of the Thematic Issue

The articles in this thematic issue approach the connection between smart urban governance and climate change adaptation from different thematic, conceptual, methodological, and empirical orientations. When put in the light of the understanding of smart urban governance as presented before, we can structure the articles in two groups: more technology-dominant approaches on the one hand, and more governance-dominant approaches on the other.

Looking at the technology-dominant approaches, the article by Cai et al. (2021) focuses on the question of how geographic information and communication technology, in the case of LEAM (land-use evolution and impact assessment model), can assist planning processes in urban areas to reach urban resilience in the city, using the example of Nanjing (China). The article by Maiullari et al. (2021) uses a quantitative morphological method to map local climate typo-morphologies with the aim of understanding and assessing the different impacts of climate, such as temperature, wind, and humidity during a hot summer period, highlighting the risk of overheating, and showing how spatial planning might implement effective adaptation strategies to reduce the risk of overheating in Rotterdam (the Netherlands). The contribution by Brandt et al. (2021) focuses on the question of how uncertainties in flood risk management might support urban planning in terms of reaching urban resilience. Uncertainty zones play a critical role for spatial planners as these zones vary around different modeled flood boundaries. The article provides an idea of how to map uncertainties and their influence on actual decision-making processes.

How are smart tools embedded in urban governance? Davids and Thaler (2021) demonstrate how tailored advice communication strategies might encourage adaptive behaviour of private homeowners in the example of flood risk management in Flanders (Belgium) and Vorarlberg (Austria). The contribution shows that the role of smart technologies in flood risk management is highly influenced by co-evolutionary interaction between impact of climate change, actors, and the institutional framework. The article by Witte et al. (2021) evaluates the technical aspects and user experiences of technologies in flood risk management in the Netherlands. The article shows how different technical, analytical, and communicative qualities need to be addressed by smart flood risk assessment tools. Nevertheless, Witte et al. (2021) underline that smart governance approaches need more than a one-size-fits-all approach as residents assess flood risks not in a homogeneous way. The article by Sas-Bojarska (2021) takes a

landscape perspective on climate change and looks into the added value of combining different governance tools and procedures in the case of urban planning in Poland. The article argues that a better understanding of the relation between environmental effects and the landscape can contribute to a better use of tools supporting spatial planning processes, which could positively influence the reduction of climate change. The article by Wright et al. (2021) shows how climate impact assessment influences regional planning processes. The article compares two regional climate change adaptation planning processes in Germany and the Netherlands showing the similarities and differences in terms of used methodologies, availability of data, and produced information in maps and how these assessment tools are used for visualisation and communication.

3. Conclusion

The selected articles within this thematic issue highlight the importance of using technologies in urban planning—smart urban governance—to provide adequate responses to the immediate climate challenges facing urban areas. The articles suggest that the introduction of technologies requires an urgent re-thinking of how decisions are made in urban regions. Consequently, the use of technologies offers and encourages an alternative understanding of governance; smart urban governance has become a crucial concept and an important alternative method to the current technocratic (top-down) governance of urban areas (Jiang et al., 2020).

The contributions show that technologies require new forms of urban governance arrangements and interactions between decision-makers and citizens. Nevertheless, the precise nature and scope of smart urban governance will depend on the needs and possibilities of the people in the different urban areas, as the articles in this thematic issue show. Smart urban governance includes a wide range of options and ideas, such as using different technologies like IoTs and AI, new administrative practices based on e-government, or new communication and collaboration tools with citizens (Jiang et al., 2020; Ruhlandt, 2018; Webster & Leleux, 2018).

The thematic issue provides evidence that technologies can be embedded into an urban system, thereby including different actors and stakeholders in the planning and decision-making process. The implementation of technologies allows urban areas not only to act more efficiently and effectively, but also encourages innovations, providing positive co-benefits, such as improved life satisfaction and biodiversity in cities. The use of technologies provides various advantages, but the planning and decision-making process should also address further complex questions, such as the issue of social equity. These issues are easily neglected but remain critical in terms of ensuring fairness and equality.

Acknowledgments

We gratefully acknowledge the help and support of the Urban Planning editorial staff in preparing this thematic issue. Further, we would like to thank the JPI-Urban Europe project FLOODLABEL for starting to question of the role of smart urban governance in climate change adaptation.

Conflict of Interests

The authors declare no conflict of interests.

References

- Andersson, E., Haase, D., Anderson, P., Cortinovis, C., Goodness, J., Kendal, D., Lausch, A., McPhearson, T., Sikorska, D., & Wellmann, T. (2021). What are the traits of a social-ecological system: Towards a framework in support of urban sustainability. *npj Urban Sustainability*, 1(1), 1–8.
- Brandt, S. A., Lim, N. J., Colding, J., & Barthel, S. (2021). Mapping flood risk uncertainty zones in support of urban resilience planning. *Urban Planning*, 6(3), 258–271.
- Bush, J., & Doyon, A. (2019). Building urban resilience with nature-based solutions: How can urban planning contribute? *Cities*, 95, Article 102483.
- Cai, Z., Page, J., & Cvetkovic, V. (2021). Urban ecosystem vulnerability assessment of support climate-resilient city development. *Urban Planning*, 6(3), 227–239.
- Davids, P. R., & Thaler, T. (2021). Resilience communities: How we can encourage adaptive behaviour through smart tools in private-public interaction. *Urban Planning*, 6(3), 272–282.
- Elmqvist, T., Andersson, E., Frantzeskaki, N., McPhearson, T., Olsson, P., Gaffney, O., Takeuchi, K., & Folke, C. (2019). Sustainability and resilience for transformation in the urban century. *Nature Sustainability*, 2, 267–273.
- Feagan, M., Matsler, M., Meerow, S., Munoz-Erickson, T. A., Hobbins, R., Gim, C., & Miller, C. A. (2019). Redesigning knowledge systems for urban resilience. *Environmental Science & Policy*, 101, 358–363.
- Hollands, R. G. (2008). Will the real smart city please stand up? Intelligent, progressive or entrepreneurial? *City Analysis of Urban Change, Theory, Action*, 12(3), 303–320.
- Intergovernmental Panel on Climate Change. (2018). *Global warming of 1.5 °C*. <https://www.ipcc.ch/sr15>
- Jiang, H., Geertman, S., & Witte, P. (2020). Smart urban governance: An alternative to technocratic “smartness.” *GeoJournal*.
- Maiullari, D., Pijpers-van Esch, M., & van Timmeren, A. (2021). A quantitative morphological method for mapping local climate typo-morphologies. *Urban Planning*, 6(3), 240–257.

Meerow, S., & Newell, J. P. (2019). Urban resilience for whom, what, when, where, and why? *Urban Geography*, 40(3), 309–329.

Ruhlandt, R. W. S. (2018). The governance of smart cities: A systematic literature review. *Cities*, 81, 1–23.

Sas-Bojarska, A. (2021). Landscape as a potential key concept in urban planning for the environment—the case of Poland. *Urban Planning*, 6(3), 295–305.

Tempels, B., & Hartmann, T. (2014). A co-evolving frontier between land and water: Dilemmas of flexibility versus robustness in flood risk management. *Water International*, 39(6), 872–883.

Ürge-Vorsatz, D., Rosenzweig, C., Dawson, R. J., Sanchez Rodriguez, R., Bai, X., Salisu Barau, A., Seto, K.

C., & Dhakal, S. (2018). Locking in positive climate responses in cities. *Nature Climate Change*, 8, 174–176.

Webster, C. W. R., & Leleux, C. (2018). Smart governance: Opportunities for technologically mediated citizen co-production. *Information Polity*, 23(1), 1–16.

Witte, P. A., Snel, K. A. W., & Geertman, S. C. M. (2021). Less is more? Evaluating technical aspects and user experiences of smart flood risk assessment tools. *Urban Planning*, 6(3), 283–294.

Wright, J., Flacke, J., Schmitt, J.-P., Schultze, J., & Greiving, S. (2021). Comparing climate impact assessments for rural adaptation planning in Germany and the Netherlands. *Urban Planning*, 6(3), 306–320.

About the Authors



Thomas Thaler holds a PhD in Environmental Science and is currently working as a Post-Doc Researcher at the Institute of Mountain Risk Engineering at the University of Natural Resources and Life Sciences. His research and teaching activities focus on social justice, risk governance, and flood risk management.



Patrick A. Witte is Assistant Professor in Spatial Planning at Utrecht University. He is specialized in the interconnection of land use and transportation planning, with a particular focus on integrated corridor development and inland port development. He was the project coordinator of the JPI Urban Europe ENSUF project FLOODLABEL. His research interests are integrated spatial planning, transport infrastructure systems, transformations of cities, land use planning, and economic effects assessment.



Thomas Hartmann is Professor at the School of Spatial Planning at TU Dortmund University, Germany. He is also affiliated with Jan-Evangelista-Purkyně University Ústí nad Labem, Faculty of Social and Economic Studies. He conducts research on the relationship between land policy and its instruments, and flood risk management and retention. Additionally, he is President of the International Academic Association on Planning, Law, and Property Rights.



Stan C. M. Geertman is Professor of Planning Support Science and Chair of Spatial Planning at Utrecht University. He has published widely in both national and international journals and has published a range of (editorial) books. He is Editor of the international peer-reviewed journal *ASAP* and member of the editorial board of several other scientific journals. He has been member of several international conference organisations. He was principal investigator of the JPI Urban Europe ENSUF project FLOODLABEL.