Editorial to the Special issue on planning resilient cities and regions

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Guest editorial/editorial

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In May 2018, the city of Bodø, in Norway, hosted the 54th annual Congress of the International Society of City and Regional Planners (ISOCARP) on 'Cool Planning: Changing Climate and our Urban Future'. Realizing that the Arctic experiences an unsettling mix of air and ocean phenomena that may trigger a catastrophic chain of events, the host city, located 80 km inside the Arctic Circle, organized discussions around the substantial climate change dangers. The congress welcomed planning practitioners and researchers from all over the world who presented their experiences dealing with climate resilience topics. This special issue extends some of these debates and addresses contemporary planning topics on overcoming climate change challenges in cities. Some extra articles have been included to complement the research scope. The focus and the primary challenge of this special issue are to present various strategies and practices that have been applied to achieve climate resilience in cities and regions worldwide.

1. The challenges of climate resilience in urban areas

Worldwide, scholars agree that cities and urban regions experience higher vulnerability levels and impacts of climate change than natural areas (Revi et al., 2014; UNFCCC, 2016; UN-Habitat, 2011; UN-Habitat, 2017). Therefore, cities globally are making climate resilience an important planning goal.

Climate change risks fall into four main categories: flooding and water management problems; strong winds; high temperatures; and draughts. Their consequences affect all human settlements. However, depending on their geographic location, local characteristics, community size, and local economic conditions, the actual impacts of climate change in urban areas may vary. Moreover, urban arrangements and local metabolism processes also affect local weather conditions. Dense downtown districts are prone to enhanced UHI (Urban Heat Island) effects and higher air pollution levels (Beaudoin & Gosselin, 2016; Benmarhnia et al., 2016; Lefevre et al., 2015; Mahlkow & Donner, 2017). Large urban concentrations affect airflows and hydrologic cycles, not just within the metropolises but also in the surrounding coastal zones (Hallegatte et al., 2013; Revi et al., 2014; Wallace, 2017).

Accelerated urbanisation impairs effectively tackling climate impacts. Rapid population growth requires building more housing and infrastructure, combined with adaptation strategies (de Coninck et al., 2018). The already existing vulnerability further deepens the enduring crisis (Gober et al., 2010; Newman et al., 2017; Revi et al., 2014). Despite the limited share of urban areas in the global land surface – estimated at 0.51% (Schneider et al., 2009) – its ecological footprint extends much further, which contributes to the shrinking of natural and semi-natural land (Ellis et al., 2010; Revi et al., 2014). Some studies (Seto et al., 2012; Solecki et al., 2013) estimate that by 2030, the urban land cover will grow by 1.2 M km^2. Consequently, the shrinking green infrastructure will increase the vulnerability of the urban population (Revi et al., 2014). If cities lack the necessary organisation capacity, their growth may further increase their vulnerability.

Whereas urban growth creates some potential for successful adaptation practices, it also creates challenges, in particular, in low-income countries where the dangers rise due to insufficient infrastructure; inadequate health and emergency services; lack of measures to prevent disasters; and low quality of residential structures which might be easily damaged (Field et al., 2012; Georgeson et al., 2016; Grafakos et al., 2020; Reckien et al., 2015; Revi et al., 2014). Therefore, several studies recommend to maintain and adapt the urban fabric (Revi et al., 2014), including urban infrastructure, services, the building stock and energy systems (Solecki et al., 2018; Zimmerman & Faris, 2011).

2. Systems approach to urban resilience

In the Paris agreement, the United Nations pointed at climate adaptation and achieving resilience as a global objective (UNEP, 2017). The transformations needed to achieve this global objective will involve all aspects of city functioning, which relates to the resilience of the urban system: '*Urban resilience refers to the ability of an urban system - and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales - to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity*' (Meerow et al., 2016, p.39).

IPCC (Intergovernmental Panel on Climate Change) defines resilience in cities as '*the ability of urban centres (and their populations, enterprises, and governments) and the systems on which they depend to anticipate, reduce, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner*' (Revi et al., 2014, p.547).

Urban planning is one of the disciplines which actively seeks to implement objectives and goals related to urban resilience. The most significant challenge that urban planners now face is to integrate climate adaptation policies into holistic urban planning frameworks at various levels and scales. The complexities escalate, as climate change takes place locally, regionally and internationally, due to remote relationships, such as import of resources or products or people's mobility (Lin et al., 2018; Seto et al., 2012). The potential synergies of climate change impacts and current conditions will increase the overall complexity of the functioning of urban systems, making the adaptation processes more challenging (Ernstson, 2013; Ernstson et al., 2010; Revi et al., 2014).

The complex nature of urban systems' resilience stems from their characteristics. To conceptualise urban systems, we first bring up factors

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as population, size, economic and social conditions, infrastructure and services availability, and other internal factors, such as government efficiency. Secondly, we consider the changing conditions of the climate. Meerow et al. (2016) point at four principal components of urban systems:

- socio-economic dynamics,
- urban infrastructure and form,
- network material and energy flows and
- governance networks.

In order to systematise the solutions brought about by urban planning, we need a comprehensive framework able to organise the collected inputs. This general framework defines the critical layers of the socio-ecological organisation, which helps structure urban resilience research.

The article of *Shi, Zhai, Xu, Zhou, Lu, Liu, and Huang* integrate complex adaptive systems theory into a theoretical model to assess urban systems resilience. Approaching urban systems as dynamic and open, they aim to improve the cognition and evaluation of a socio-ecological urban system.

3. The urban planning practice as a driver for innovation

The urban literature has produced a good number of case studies contributing to the diversity of solutions to climate resilience (Araos et al., 2016; Brink et al., 2016; Carter et al., 2015; Dhar & Khirfan, 2017; Georgeson et al., 2016; Hunt & Watkiss, 2011) [a comprehensive list of articles and books is provided by Revi et al. (2014, Box 8-1) and by de Coninck et al., 2018]. Many publications draw on practical experience by professionals in architecture, urban planning or disaster risk management (Rosenzweig et al., 2015; UNDRR, 2019; UN-HABITAT, 2011; UNISDR, 2016).

In this special issue, next to case studies from high-income countries of the global North, we include several studies which come from low and middle-income countries.

They present innovative approaches, instruments and strategies which illustrate how governments, communities, and stakeholders are dealing with the different effects of climate change, by means of policy-making planning and urban management at the regional and municipal scale. The most original approaches come from the planning practice, which has to deliver immediate responses due to the persistent demand for increased resilience. The selected papers present experiences from the US, Canada, Australia, Ecuador, Indonesia, Cambodia, South Pacific Islands, Ethiopia, and discuss many others. They constitute a valuable asset to show the different local situations resulting from climate-related transformations.

4. Governance networks and planning policies

Except for extreme situations, urban resilience rarely becomes a main topic in the planning debate; it tends to be discussed in relation to other urban issues. However, there are many ways in which planning can directly contribute to urban resilience. To begin with, building codes and planning regulations may become useful tools to implement adaptation solutions (ORR, 2019). Furthermore, the planning practice has produced a growing number of adaptation plans (Carter et al., 2015; Dhar & Khirfan, 2017; Mahlkow & Donner, 2017). Additionally, new possibilities may arise from the potential synergies stemming from the collaboration of governance networks, which represent the actors and stakeholders who make the decisions that affect urban systems' functioning. Such networks include a wide range of stakeholders in the hierarchical planning system, the interoperability between various governance bodies, and the cooperation with the private sector (Araos et al., 2016; Hölscher et al., 2019; Revi et al., 2014; Siders, 2017).

Governance networks at all levels need to be involved in building local resilience. International organisations responsible for global agreements may offer a framework for climate mitigation, going down to national governments, regional and municipal authorities and civic organisations. National policies have an important role to play, but the bottom-up activities and individual decisions and collaboration between local government and citizens' associations are also required to achieve the necessary momentum. This is why community participation practices are often recommended as an essential tool to enhance urban resilience.

This special issue presents five papers dealing with these topics. *Alexander's* contribution focuses on state-level planning policies in the USA, examining climate action plans to assess the emission reduction outcomes.

Ariyanti, Gaafar, De La Sala, Edelenbos and Scholten describe the challenges that local governments face in the fields of urban planning and water resource management in urbanised volcanic areas. Their study focuses on two distinct urbanised volcanic river basins: Yogyakarta, Indonesia and Latacunga, Ecuador, showcasing the problems which affect urban areas around more than 500 active volcanoes worldwide, with 600 million people living near them. The authors examine the interplay of top-down and bottom-up planning practices of the Ecuadorian case-study.

The article by *Nop and Thornton* focuses on community participation, presenting the demand for active community involvement in two neighbourhoods in Phnom Penh, Cambodia.

The case study of *Trundle* in South Pacific Islands explains how bottom-up, indigenous approaches to climate change resilience may be highly successful in post-disaster processes. The results prove distinct values of equity within the framework of socio-ecological resilience and emphasise the importance of kinship and familial networks and traditional practices to deal with climate change adaptation and enhance the resilience at the sub-city scales.

By the same token, *Fitzgibbons and Mitchell* deliver recommendations for more inclusive and equitable resilient planning process. Their study focuses on the analysis of the innovative urban experiment to access and include disempowered residents.

5. Heuristics of urban planning - urban infrastructure and form

The heuristic approach used by urban planners and designers addresses the practical issues of urban infrastructures and form. The solutions look for more specific interpretations of urban settlements' resilience in a given context. The adaptation capacities of cities in this regard differ fundamentally and mainly depend on measurable factors: emissions of GHG (greenhouse gases); the size of the population and the urban centre; economic conditions and outcomes; human development index; share of land covered with infrastructure services and their quality; and the ecological footprint of a town (Revi et al., 2014). The IPCC WGII lists four additional factors which influence the adaptation capacities: '*local government capacity*; *the proportion of residents served with risk-reducing infrastructure and services*; *the proportion living in housing built to appropriate health and safety standards*; *and the levels of risk from climate change's direct and indirect impacts*' (Revi et al., 2014, p.545). Moreover, the impacts on urban structures show a cascading character, which appears in basic infrastructure services, such as water and sewage networks, transportation and communication facilities, energy and others (Gasper et al., 2011; Hunt & Watkiss, 2011; Revi et al., 2014).

In their seminal writings, Newman et al. (2009, 2017) highlight that the car and fossil fuel dependence need to be limited to achieve more self-sufficient living environments. This special issue includes the keynote article by *Newman*, entitled Cool Planning: Climate Change and Planning, who claims for decoupling fossil fuels use from GDP by developing alternative energy sources and means of transportation. Such an approach entails the transformation of urban structures and demands progressive urban planning policies to encourage and implement these changes. Newman's reflections on pedestrian versus motor cities pertain to urban metabolism and the reduction of energy use,

stressing the role of pedestrian circulation and mass transportation.

The pedestrian city is further explored in the article by *Booth, Chmutina and Bosher*, who study the security measures for the design of crowded places. The organisation of such places poses challenges and requires a clear planning policy and guidance on urban spaces' security. *Hagos, Adnan and Yasar's* article deals with another challenge of pedestrian mobility: the design of sidewalks able to support local economic activities. They study the impact of the placement of sidewalk vendors on the pedestrian movement patterns in Ethiopia. Both of these studies belong to the socio-economic dynamics level of the urban system's framework and conclude with design recommendations.

Another important topic related to urban infrastructure and form is urban greenery, as the role played by green infrastructure contributes to an adaptive urban ecological structure. One of the primary factors that produce resilient settlements is integrating ecosystem services (Brink et al., 2016). They can secure food and contribute to adaptation measures such as water retention thanks to the improved permeability and cooling effect assured by the presence of vegetation, and, on the other hand, social safety nets ensured by the enhanced social capital.

In this special issue, the role and development of the ecosystem services framework have been comprehensively presented by *Delibas, Tezer and Bacchin*, who address the recognition of soil ecosystem services in spatial planning. Their contribution emphasises the relationships between climate change, soil degradation processes and offer recommendations for the planning policy to protect the soil through integration of this theme into the planning framework.

Furthermore in this context, the article by *Kupers* on the impact of greening schoolyards on city resilience offers valuable insights on urban interventions which are both well distributed and with the potential to influence the city as a whole.

6. Final remarks

The contradictions and tensions in defining a conceptual framework for climate resilience translate into the challenges of defining how urban planning should creatively improve the existing resilience of cities. This is undoubtedly linked to the complexity of the systems approach, which addresses the resilience of socio-ecological urban systems – covered in the theoretical section *Systems approach to urban resilience*. The presented papers apply the framework organized around the four principal components of socio-economic systems and, at the same time, include articles contributing to two main topics of the contemporary urban planning debate: planning processes and policy making with multiple stakeholders – in the section on *Governance networks and planning policies* – and the planning of urban form and infrastructure – in the section on *Heuristics of urban planning - urban infrastructure and form*.

The collection of articles included in this special issue offer innovative contributions to the field of urban resilience in urban areas, filling research gaps and enriching current academic debates in planning. They bring new ideas and inspiration – in topics such as community involvement; implementation of plans; economic development; informal settlements; and others. They also provide advanced knowledge on more technical topics that confront adverse effects of climate change in cities and regions, such as risks of volcanic eruptions; challenges to pedestrian mobility and energy resources; and so forth. Urban areas now accommodate more than half of the world's population. Not only do they work as nodes of the resources' consumption, but at the same time, they serve as centres of innovation and resilient urban planning laboratories.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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