

# **NEW CONCEPTS TO BRAZIL'S PRESSING URBAN PROBLEMS**

A conceptual debate about Nexus, Smart City, Urban Resilience and Telecoupling approaches

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## **GENERAL ABSTRACT**

Considering the staggering growth rates in urban population and industrial growth during past decades, the effects and costs of this development are becoming increasingly visible in the form of global climate change and the degradation of local ecosystems and environmental resources. Increasing economic growth in recent decades in Brazil certainly influenced its urban centres, producing major monetary resources for the country and creating many economic opportunities for millions of the livelihoods in Brazil and at the same time, increasing human pressures created social and environmental problems. To look for the potential solutions to Brazil's urban problems, several new concepts have emerged recently from the international debates, both in academia and in practice that can potentially assist in framing solutions to Brazil's urban problems. However, surprisingly there has been little concrete application of these new approaches in the Brazilian context. Smart Cities, Telecouplings, Nature-based Solutions (NBS), Payments for Ecosystem Services (PES), Nexus, Green Infrastructure etc. are the buzzwords that promise to make a difference in research and practice of sustainable city planning in an urbanizing world. These concepts are rooted in understanding the cities as a social-ecological system.

The rise of these concepts has been entwined with another emerging concept named "Urban Resilience". 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). Reviewing international scholarly work demonstrates that building resilience through urban and peri-urban ecosystem services for a city has two values: a) offering sustainable options to tackle the current challenges and b) ensuring the sustainable planning of a city (McPhearson et al. 2015) against natural and anthropogenic shocks for future uncertainties.

Understanding socioecological systems, including cities, as an interconnected and interdependent whole, is of high importance in order to effectively put into practice the

sustainability concepts. Often times, urban planning does not meaningfully innovate its approaches but just superficially rebrands existing approaches for several reasons, e.g. international or third sector funding or city branding and image. If the above-mentioned concepts should help in issues like tracing the sources of the environmental problems, they should promote a rethinking of urban planning from the ground up as a whole systematic approach, including its connections with both close (such as peri-urban areas) as well as distant geographic units far beyond the geopolitical limits of a city. Nexus and ecosystem services approaches have shown to be a fruitful approach to uncover the meaningful data that could help to convince decision makers and planners in engaging in this paradigm shift.

This session proposes a debate about how these concepts can be seized on the local level in different urban contexts. Our session provides the platform for debate and question on how far we should actually put these original ideas into practice, scale them down, and generate context-specific science for urban sustainability. This way we want to point out the conceptual limitations, but also the possibilities they bring in transforming the existing approaches. Proposed questions to be addressed, among others are:

- How to align with the emerging buzzwords in international urban planning academic debates with respect to the actions, plans, and strategies for Brazil's cities?
- In which ways do those new concepts foster broader integrative and more inclusive approaches to urban planning and management as well as research on those issues?
- To what extent can valuation and payments for the urban and peri-urban ecosystem services and similar concepts be integrated into urban planning to build urban resilience in Brazil?
- While some services such as wastewater treatment, air pollution removal, flood regulation, and cultural and social services are provided locally by urban ecosystems, some others (e.g. fresh water and energy supply) might be generated in an area of 100 to 300 km far away from the city. What are the geographical and socio-ecological boundaries of "urban and peri-urban ecosystem services" for a city?

## Resource Nexus: Impact of Urban and Peri-urban Dynamics for Water Management

**Mahesh Jampani** (United Nations University Institute for Integrated Management of Material Fluxes and of Resources and TU Dresden) and **Tatiana Maria Cecy Gadda** (Universidade Tecnológica Federal do Paraná)

Over the last five decades, industrial revolution and globalization has its effect on rapid growth in urbanization around the world, especially in the developing countries. The continuous increasing urban populations and rapid land use changes pushed the demand for water resources, and further creating water stress with inefficient water supplies. The demands are only met by transporting the water from hundreds of kilometres away to the urban areas. Water consumption in the urban pressure environments at the same time

increased the amounts of wastewater generation from the cities. Untreated or partially treated wastewaters from the cities is being funnelled into the riverine and lacustrine ecosystems in and around the urban centers, which tends to increase the urban floods and pollution loads. In the urban and peri-urban areas, many landscapes are irrigated with these wastewaters for producing food and non-food crops. While wastewater use in agriculture providing livelihood opportunities with respect to water and nutrient supply but it has adverse environmental and health impacts. Understanding the nexus of water, waste, land, energy, food, climate and health in the complex urban systems will help us to develop efficient integrated environmental resources management strategies that will contribute to the water and food security, urban resilience, and also to achieve the respective Sustainable Development Goals.

## Water sensitive urban design and resilience in urban areas

**Mariana Cunha Oliveira Santos** (University of Duisburg-Essen) and  
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Transitions to more sustainable ways of water management have been recognized as urgent shifts to achieve necessary resilience in cities. Current discussions point out that approaches integrating water management into urban design such as Water Sensitive Urban Design (WSUD) are powerful strategies to support sustainability and resilience of cities. Due to irregular land use and policies to protect permeable areas and natural resources, Ho Chi Minh City in Vietnam (HCMC) becomes one of the ten top cities worldwide with higher risks for population and infrastructure over flooding events. Frequent flooding causes severe disruption on built infrastructure and peoples' wellbeing showing the urgency in developing integrated planning strategies that are resilient enough to protect the city against flooding risks and improve quality of life in urban areas. This research aims to investigate in how far WSUD have the potential to address uncertainty regarding flooding risks in HCMC while at the same time, improve sustainability in the urban area. This study is applied to a housing settlement in HCMC and evaluates morphological data by qualitative methods and quantitative assessments of flood extends. The outcome is suggestions for adopting more integrative planning practices based on WSUD indicators.

## Resilience Trade-offs in Applying Nature-based Solutions to Deal with Water-related Urban Challenges

**Adnan Habibpourzare** (University of Duisburg-Essen) and **Niklas Werner Weins** (Universidade Estadual de Campinas)

Using the example of Tehran (Iran), Cape Town (South Africa), Cologne and Dresden (Germany), this work firstly investigates the potential of applying Nature-based Solutions (NBS) to deal with water-related urban challenges such as flood, drought, and urban green spaces management, and secondly discusses the Socio-hydrological Resilience Trade-offs of hosting NBS in urban and peri-urban ecosystems. The Urban Socio-hydrological Resilience Trade-offs concept was adopted from M. Sivapalan's human-water couplings as "socio-hydrological systems" and the idea of "resilience trade-offs" by Chelleri et al. It was applied to move beyond the conventional supply-demand trade-offs analysis and to discuss gains and losses across spatial and temporal scales. It also introduces a GIS-based spatial decision support model to find proper sites to host NBS within cities and to overcome barriers like land requirement, health, and social-cultural concerns. The results demonstrated that while the quantity and diversity of urban ecosystems decreases in times of disaster, urban systems with NBS continue to deliver a range of ecosystem services. It was also established that Socio-hydrological Resilience Trade-offs concept could be served to support decisions on expanding a chain of urban ecosystem services through water-related NBS.

## Nature-Based Solutions and the rhetoric of sustainable development: limits and possibilities of the green agenda

**Leticia Vellozo** (Universidade Federal Fluminense/GPDU)

Sustainable development is an idea that has been widely incorporated to urban planning in the last two decades due to paradigm changes concerning the environmental issue. The transformations given are not only about what is understood as conservation, but also, and especially, how the relationship between society and nature is understood. With the universalization of the concept of sustainability, discourses and practices related to the word have been elaborated, both globally and locally. This general acceptance of the idea, however, did not take place without sacrificing its precision. Its conceptual fragility allowed the idea of "sustainable development" to become a wide term, harboring several measures that seek to promote a better quality of life and guarantee a future with quality and healthy environments. If, on the one hand, generalization has the merit of linking initiatives from diverse origins, on the other, it is capable of universalizing individual interests, since meaning can change as needed. Our discussion seeks to promote an epistemological debate on recent concepts adopted by urban planning, with special attention to "Nature Based Solutions," the

influence of the international agenda on those emerging buzzwords, their limits and possibilities.

## Searching for the citizen in the Smart City concept

**Leticia Costa de Oliveira Santos & Silvestre Labiak Jr.** (Universidade Tecnológica Federal do Paraná)

Many solutions aiming to minimize social and environmental impacts and to improve services and well-being in cities have been developed. The Smart City - one of the 21st century's utopias - is a global trend, popular as a brand to enhance city competitiveness. It is usually related to digitalization of urban services, application of information and communication technologies to generate, integrate and manage greater volumes of data. Science and data-based planning may be broader and more reliable to support urban management and planning. The initiatives usually emerge on big tech enterprises that see the Smart City trend as a way to expand their global markets. Also, City administrations and research centers see them as opportunities to develop partnerships and exchange information and expertise. These “solutions” may, however, operate ignoring social and environmental aspects that are more localized than commercial and informational flows. While there is discourse on democratizing aspects of the smart city, there may be a lack of citizen engagement. Urban and environmental management seem depoliticized since algorithms and sensors, and natural processes are misunderstood as apart from society and, therefore hide power tensions.

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Considering current urban growth, its costs are becoming visible in global climate change and degradation of ecosystems. Potential solutions to urban problems emerge in new concepts from international debates in academia and practice. Surprisingly there is little concrete application of these new approaches in the Brazilian context. Smart Cities, Telecouplings, NBS, PES, Nexus etc. are buzzwords in city planning discourse and research. Understanding cities as an interdependent whole is important to effectively put into practice sustainability concepts. However, urban planning often does not really innovate its approaches, but just superficially rebrands existing ones. Rethinking of urban planning is necessary from the ground up as a systemic whole, including connections with the peri-urban and beyond. Nexus and ecosystem services seem to be a fruitful approach to uncovering meaningful data that helps convince planners in engaging in this paradigm shift.