Sustainability **2015**, *7*, 10000-10006; doi:10.3390/su70810000

OPEN ACCESS

sustainability

ISSN 2071-1050

www.mdpi.com/journal/sustainability

Editorial

A New Urban Agenda: Introduction to the Special Issue on "Sustainable Urban Development"

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Academic Editor: Marc A. Rosen

Received: 20 July 2015 / Accepted: 21 July 2015 / Published: 24 July 2015

Abstract: Since the start of the 21st century, humanity has been a predominantly urban species. This Special Issue is about the future of cities and how urbanization will develop when based on principles of sustainability. It explores the underlying dimensions of the transformation of existing cities and the design of low carbon green precincts and their urban systems. The view of the papers presented in this Special Issue is holistic and takes questions of social sustainability into account. This editorial highlights the contents and methodologies of 13 selected papers, while presenting diverse issues in strategies, concepts and policies for sustainable urban development.

Keywords: high-performance low carbon precincts; integration of low carbon technologies into social and behavioral context; complex urban systems; resilient communities; sustainable consumption; urban microclimates

1. Background to the Special Issue

Since the start of the 21st century, humanity has been a predominantly urban species. This Special Issue is about the future of cities and how urbanization will develop when based on principles of sustainability. It explores the underlying dimensions of the transformation of existing cities and the design of low carbon green precincts and their urban systems. The view of the papers presented in this Special Issue is holistic and takes questions of social sustainability into account. The aim of the Special Issue is to define a new agenda of change for sustainable urban development that can be transferred and replicated in other cities: urban solutions and success stories (case studies) to ensure we are all aware of the possibilities towards "the urban future we want".

The social dimension of the new urban agenda for the transition to a low carbon economy is a key challenge to cities. The need for practical and end-user focused research in the field is widely acknowledged and my proposal for this Special Issue—to publish papers that combine cutting edge engineering with social aspects—was readily accepted. Subsequently, the authors of the academic papers were invited to develop their research papers and submit them to the journal's rigorous review process. All authors have looked at the international applicability of their findings in the journal articles.

The following keywords were identified as relevant for the theme:

- High-performance low carbon precincts
- Integration of low carbon technologies into the social and behavioral context
- Complex urban systems
- Resilient communities and sustainable consumption
- Urban microclimates

Thirteen papers were accepted and published; they form the content of this Special Issue. The papers presented provide insight into the *modus operandi* of sustainable urban development.

2. Content of the Special Issue

The Special Issue on *Sustainable Urban Development* is about the challenges of tomorrow's cities and what we can consider to do to make urban settlements healthier places while radically reducing their greenhouse gas emissions. It is also about how to inspire and implement long-term systemic change for urban sustainability.

Cities are the powerhouses of our economy and they can be (and frequently have been) generators of wealth, innovation and social inclusion. Cities provide economic opportunities and a good quality of life, and workers with specialized skills flock to cities to be near to the sorts of firms that hire them (New York City, San Francisco and London are good examples of this). Since 2008, more people live in cities than in rural areas, and urbanization is expected to continue, most notably in cities in the emerging and developing world (led by booming economies in China, India, the Middle East, South America, and Africa). To manage this process of transformation and urban growth, cities will need to be designed, retrofitted and managed in new and better ways, to decarbonize their energy supply and minimize waste in all forms, encourage urban biodiversity, and allow ecosystems to flourish and provide inhabitants with the basic elements of wellbeing in a resource- and energy-efficient manner. In the book *Low Carbon Cities. Transforming Urban Systems* [1], I noted that "re-envisioning the design and management of cities, green buildings and infrastructure systems will be central to the urban evolution".

Today, numerous cities worldwide are engaged in urban projects and activities in a concerted drive towards sustainable development. It becomes obvious that the attributes of compactness, mixed-use and walkability are a city's elegant and enduring qualities, where monumental civic buildings touch us and where quality density manifests itself through diversity in variations of 3- to 10-storey urban blocks, supporting the public realm and streetscape. These are the well-known principles of timeless urban development that should be applied to all new precincts, and an experienced urban designer should always be aware of how to apply them generously to existing urban situations to ensure pleasant, human-scale, "compact yet comfortable", mixed-use precincts and neighborhoods (and avoiding

monotonous, repetitive buildings, which are so easy to create). We can build on these distinctive characteristics of our cities while maintaining their sense of place, cultural diversity and walkability, to produce meaningful public-spirited works. In arguing for a new ethics of the urban condition, we can point out that the traditional urbanism of European cities—such as we can find in Barcelona, Paris or Berlin—is also ecological urbanism [2].

Cities around the world are facing an ever-increasing variety of challenges that seem to make more sustainable urban futures elusive. The required transformation to achieve sustainable urban development for a city like Vancouver is likely to be immense: one author explores the dimensions of transformation that would be needed in each of these domains for the per capita consumption patterns of urban dwellers to achieve ecological sustainability (measured against the ecological carrying capacity), and she concludes that a 73 percent reduction in household energy use, a 96 percent reduction in motor vehicle ownership would be required to achieve truly sustainable urban development.

Due to the interdisciplinary character of sustainable urban science, the research methodologies used by the authors give us greater insights and open new frontiers of how to handle the challenges of sustainable urban development. For instance, one team of authors proposes a new conceptual framework to broaden the development of urban ecological research and its application to sustainability; highlighting how urban areas are complex, connected, diffuse and diverse and what these interconnected features mean for the study of urban ecosystems and sustainability. Other teams have developed tools which have the potential to support urban planning decision-making for assessing sustainable development scenarios.

Most papers cover more than one narrow theme, however, for the purpose of this editorial they have been grouped under the following two headings.

- Achieving Better Urban Precincts
- A new agenda of change for sustainable urban development

2.1. Achieving Better Urban Precincts

This group is made up of papers where the predominant focus is on mechanisms and strategies for achieving better conditions in urban precincts (either new built or retrofitted), and how to measure progress in this field.

Article 1, entitled "The New Global Urban Realm: Complex, Connected, Diffuse, and Diverse Social-Ecological Systems" [3], explores how urbanization has been and continues to be a transformative process that affects ecosystem integrity and the health and well-being of people around the world. The authors note that—although cities tend to be centers for both the production and consumption of goods and services that degrade natural environments—there is evidence that urban ecosystems can play a positive role in sustainability efforts.

In her contribution, Jennie Moore examines in Article 2 the relationship between "Ecological Footprints and Lifestyle Archetypes" [4] by exploring the dimensions of consumption and the transformation needed to achieve urban sustainability. She hereby argues that the global urban transition increasingly positions cities as important influencers in determining sustainability outcomes. However, urban sustainability literature tends to focus on the built environment as a solution space for reducing energy and materials demand. Therefore, she notes that equally important is the consumption characteristics of the people who occupy the city (including criteria such as the size of dwellings and

motor vehicle ownership, which are partially influenced by urban form and by cultural and socio-economic characteristics; while dietary choices and purchases of consumable goods are almost entirely driven by the latter). Using international field data that document urban ways of living, she developed lifestyle archetypes coupled with ecological footprint analysis that developed consumption benchmarks in the domains of food, buildings, consumables, transportation, and water that correspond to various levels of demand on nature's services.

Article 3 is looking at the role of urban greenery, including interdisciplinary principles of landscape ecology and ecosystem geography [5]. The authors describe a method for "Setting Priorities for Urban Forest Planning. A Comprehensive Response to Ecological and Social Needs for the Metropolitan Area of Rome". The researchers argue that urban forests represent key elements of green infrastructure and can provide essential ecosystem services in both the ecological and social spheres. Therefore, they note that forestation planning plays a decisive role in the sustainable development strategies of metropolitan areas and addresses the challenge of maintaining biodiversity while improving human health and well-being. The team presents a methodological approach that can be used to identify priorities in urban forest planning and can provide comprehensive responses to ecological and social needs in any metropolitan context, not just in Rome (Italy).

The study presented in Article 4 investigates how the urban challenges are being driven by, and exacerbated by, increases in urban populations and climate change [6]. This highly interesting text entitled "An Ecology for Cities: A Transformational Nexus of Design and Ecology to Advance Climate Change Resilience and Urban Sustainability" asks for novel solutions that are needed if our cities are to have any hope of more sustainable and resilient futures. The researchers argue that most of the environmental impacts of any project are manifest at the point of urban design, and therefore they posit that this is where a real difference in urban development can be made. To this end, they present a transformative model that merges urban design and ecology into an inclusive knowledge-to-action process, which they termed "ecology nexus" as ecology for cities. They also discuss how urban ecology can move from an ecology of cities to an ecology for cities based on a knowledge-to-action agenda.

The article "Transition Thinking Incorporated: Towards a New Discussion Framework on Sustainable Urban Projects" [7] by Sophie Devolder and Thomas Block focuses on the concept of "sustainable urban projects" that is inherently normative, subjective and ambiguous. The researchers argue that the popularity of sustainable urban initiatives does not guarantee that increased pressure on dominant unsustainable urban systems will occur. In their article, they argue that strong urban debates and detailed discussions on these initiatives and on urban sustainability are required to facilitate and stimulate urban systems towards a more socially just and environmentally sustainable future. As a consequence, they have been focusing on developing a discussion framework on sustainable urban projects that frames sustainable development as a challenge that concentrates on both ecological and social concerns and avoids a sole reliance on technology fixes.

The article entitled "Lost in Transition or Geared for the S-Curve? An Analysis of Flemish Transition Trajectories with a Focus on Energy Use and Buildings' [8], notes that climate neutrality and sustainable functioning are not only beneficial for the environment, but are equally beneficial for society and for the economy if well-integrated trajectories are adopted. Their case study addresses the state of the art for current transition experiments in the region of Flanders, Belgium, and focuses on actions related to

energy-efficiency of buildings. By focusing on effectively mobilizing of decision-makers and investments, a transition theory and a set of possible strategies to overcome the barriers is formulated.

The Article entitled "Low Carbon Urban Transitioning: From Local Experimentation to Urban Transformation?" is by Susie Moloney and Ralph Horne [9]. The authors look at the Australian case of the city of Melbourne, and argue that climate change mitigation remains a contested political and policy issue. While Australian cities have been actively engaging with low carbon policy for well over a decade, and numerous actions and programs have resulted, the question arises as to whether such initiatives can really amount to the required transition: a systemic change from one dominant fossil-fuel based socio-technical regime, to another, fossil-free based socio-technical regime. To progress towards low carbon urban transition, the researchers formulate a set of criteria that examine the roles of, and relationships between, different levels of government, climate change alliances, community/environmental organizations and other actors in the city (critically pointing towards significant shortcomings and policy disconnects).

2.2. A New Agenda of Change for Sustainable Urban Development

This group of five papers deal with matters related to a new urban agenda that is starting to emerge for sustainable urban development.

Vega-Azamar *et al.* have contributed the Article entitled "Sustainability Assessment of the Residential Land Use in Seven Boroughs of the Island of Montreal, Canada" [10]. This very interesting paper notes that land-use planning is a primary instrument for the proper development of cities and that an important point is the consideration of the urban form's influence on resource utilization intensity. The authors suggest an energy-based methodological approach called "Emergy Synthesis" that allows the quantification of resource use intensity and the integration of both natural and human-generated flows interacting in urban environments. These have been used to assess sustainability of the residential land use of their case study: seven boroughs on the Island of Montreal (looking at the main flows of natural resources, food, water, acquired goods and services, electricity and fuels). Some interesting results are extracted: the authors suggest that income, household size and distance to downtown are the variables affecting resource utilization intensity more noticeably; and that the allocation of green area coverage is an important parameter for controlling land use intensity. A tool is the outcome that supports urban planning decision-making for assessing sustainable development scenarios.

In their contribution of Article "Local Governments Supporting Local Energy Initiatives" [11] the authors present lessons from Saerbeck in Germany and from Lochem in the Netherlands. Local energy initiatives (LEIs) in these two towns have recently been attracting attention as ways to make substantial contributions to greening local energy systems. The authors discuss what lessons can be drawn from such successful local energy transition cases, and which strategies proved successful to support LEIs. The presented data includes in-depth interviews that show that three key factors are of great importance: building networks, managing expectations, and facilitation of learning. However, they argue that essential for the success is the close interaction and mutual trust between local government and representatives of the local communities.

No discussion of sustainable urban development would be complete without the topic of smart cities. The article "Sustainability and Competitiveness in Australian Cities" by Richard Hu [12] explores policy

making and planning for contemporary urban development, incorporating multiple dimensions of a city's progress and competitiveness. Apart from the conventional discussions that focus on urban form change and transport infrastructure improvement, this study suggests a need to better explore the opportunities deriving from the emerging smart city paradigm.

The Article entitled "An Integrated Assessment Method for Sustainable Transport System Planning in a Middle-Sized German City (Potsdam)" [13] looks at road transport systems in Germany and notes that road transport is a significant source of emissions in urban areas and that the road infrastructure has a significant impact on the urban form. The integrated assessment methodology presented reflects the city's qualitative and quantitative goals to improve public transport and promote sustainability, capturing synergies in categories that include environmental considerations as well as road safety, eco-mobility and quality of life.

The article "Response of Seismically Isolated Steel Frame Buildings with Sustainable Lead-Rubber Bearing Isolator Devices Subjected to Near-Fault Ground Motions" is a more technical paper by Jong Wan Hu [14] that investigates how entire structures can be preserved against earthquake forces, as well as inside non-structural integrities. In this study, comparative advantages for using lead-rubber bearing (LRB) isolation systems are explored by performing nonlinear dynamic time-history analyses with Near-Fault ground motions. The fact that seismic performance can be improved by installing isolation devices in the frame structure is emphasized herein through the results of nonlinear dynamic analyses; this is of some relevance in regard to maintaining heritage and in regard to the adaptive reuse of existing structures in our cities.

Finally, in Article [15] the researchers present the Finnish case: "The Power of Urban Planning on Environmental Sustainability: A Focus Group Study in Finland". This very interesting paper reports on a focus group study between planning professionals in Finland that was conducted for the purpose of examining how increased environmental awareness influences urban land use. The main finding is that urban planning is viewed as being unable to support environmental sustainability in the broader sense. In general, the participants did not see a connection between urban structure, consumption and sustainable lifestyles, and only the influence of planning on housing and daily journeys was recognized. While this is sobering, three main reasons for this were identified: firstly, environmental sustainability in its broader definition is seen as too complex for urban planners to influence alone. Secondly, the dominance of short-term economic issues in decision-making and the lack of co-operation from other stakeholders to achieve environmental aims demotivate land use planners. Thirdly, the prioritization of urban density may overrule alternative means of promoting environmental sustainability, such as the encouragement of sustainable suburban or non-urban lifestyles.

Acknowledgments

I would like to express my sincere gratitude to the reviewers for assessing manuscripts for this Special Issue. The reviewers contributed with exacting commentaries and suggestions, and I am grateful to all the authors for responding to these in a timely way. Thank you also to the team at MDPI for facilitating this Special Issue so efficiently.

Conflicts of Interest

The author declares no conflict of interest.

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