Cities and Sustainable Development

CHRISTOPHER CUSACK

Abstract

When considering the future of the world, one must first and foremost consider the future of its cities. Cities are currently home to more than half the world's population and are projected to encompass the preponderance of all future population growth. Cities also require vast inputs of energy and resources while producing vast outputs of waste. Recognition that these trends are not sustainable has generated a wealth of relevant research. How cities can be sustainably developed in such a way that meets present needs without limiting the ability of future generations to meet their own needs is the critical problem to solve. Research in a myriad of fields, including sociology, political science, economics, and geography, is active in its pursuit of the sustainable city. This essay explains the components of sustainable development and underscores the connection between sustainability and cities. Foundational research, which primarily takes a regional approach to urban analysis, is then explored. This, then, is followed by cutting-edge research that highlights new ways to measure sustainability and new efforts to build sustainable cities. The essay concludes with an examination of some of the key issues for future research, including the need to consider the cultural diversity within and between cities, as well ways to generate sustainability through pioneering efforts of planning and governance.

INTRODUCTION

Global population trends portend the need for rigorous research agendas that address the causes and consequences of an increasingly urbanized world. Efforts to predict the immediate and the long-term consequences of such urbanization as well as to explain the rapid concentration of the world's population into cities have helped foster new and innovative approaches to urban design and analysis. Oriented around the call for sustainable development, these research endeavors have recently taken on a new sense of urgency. The year 2008, a watershed year in the history of humankind, marked the first time ever the majority of humans could be classified as "urban" as opposed to "rural." The growth of cities, in terms of area, population size, resource consumption, and environmental degradation, is undoubtedly among the most pressing challenges of the twenty-first

century. Without question, any discussion of sustainable development must first and foremost take place at the city level.

First identified in the 1987 United Nations publication *Our Common Future*, sustainable development has been identified as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The goal of sustainable development is oriented around the "three E's" of environmental protection, economic growth, and social equity. However, as these elements remain frequently undefined or even contradictory, there remains a pressing need for a holistic agenda of research and practical application. Such a research agenda must account for both place and culture, as a one-size-fits-all approach will likely do more harm than good. With the growth of many cities of the global south at near exponential rates, and with untenable consumption patterns in the urbanized north, any new approach to sustainable development must be place-specific and city-oriented.

Research into the nexus between cities and sustainable development has evolved from thinking of "green cities" as those with ample open space and parks to a broader analytical approach concerned with a balance between environment, economy, and equity. Urban sustainability involves inquiry from a myriad of disciplines, including sociology, political science, economics, geography, planning, and architecture, among others. While each discipline has heretofore independently provided contributions to the concept of urban sustainability, more recent and cross-disciplinary research is providing promising opportunities for truly sustainable development. This entry, then, highlights the oft unsustainable growth of cities, examines the more recent efforts to measure urban sustainability, and identifies prospective approaches aimed at providing universal means to achieving the sustainable city.

FOUNDATIONAL RESEARCH

Although cities of the world are projected to continue experience very different trends in terms of population growth and economic performance, cities from both the global north and south are similarly affecting resources and the environment and would benefit from sustainable urban development. Research into the ways in which cities may be deemed unsustainable are ubiquitous and typically highlight environmental problems associated with urban growth. For example, the urban heat island effect, whereby the average temperatures of cities may typically run 3.3–4.4°C (6–8°F) warmer than their rural environs, has received significant attention. Increases in anthropogenic heat and emissions of atmospheric pollutants, in tandem with decreases in natural vegetation, form distinct islands of heat surrounded by countryside

of cooler temperatures. Continued unsustainable growth and sprawl of cities will only serve to exacerbate this heat island effect, impacting both urban populations and climates.

Cities also are noted for their disparate consumption of resources, waste generation, and pollution output. Researchers such as Jo Beall and Sean Fox (2007, p. 4) have pointed out that while urban areas cover only two percent of the earth's land, they demand nearly three-quarters of all natural resources consumed in a given year. As a result, much research along the lines of sustainable development is oriented around the concept of the "ecological footprint," which measures the amount of land needed to support a city. Previous studies have estimated that cities around the world far exceed the sustainable footprint of 4.5 acres per person. London, for example, has an ecological footprint that is calculated to be upward of 300 times larger than its land area. Strains on resources and the environment are therefore hallmarks of cities around the world, although for differing reasons. In the developed North, cities continue to demonstrate low-density sprawl and automobile dependency. In the developing South, urban population growth far exceeds existing infrastructure, jobs, and housing, leaving people to live in dreadful conditions. Thus, while the causes are varying, the results are similarly unsustainable cities around the world.

CITIES OF THE GLOBAL SOUTH

Future growth of cities around the world is to be far from uniform, with virtually all urban expansion occurring in the less developed world of the global South. Already many of the megacities of the South have populations that rival entire countries of the North. For instance, at 23 million inhabitants, the city of Shanghai, China, has a larger population than the continent of Australia. Likewise, the combined population of the Indian cities of Mumbai and Delhi exceeds the total population of Canada. The Economist Intelligence Unit (2011, p. 8) projects that in just over a decade, China will have approximately 225 cities with at least one million residents—or 200 more cities of this size than Europe has at the present time. At all levels of the population spectrum, cities of the global South are experiencing exceptional and unsustainable growth.

Research into these cities generally concentrates on the "brown agenda" of economic growth and job creation. With millions of people being added yearly to these already overburdened cities, priority is indeed given to efforts that seek to alleviate poverty and generate prosperity. The link between local knowledge and outside expertise and by the role played by nongovernmental organizations has been at the very foundation of research in cities of this world realm. Environmental concerns, although not

disregarded, are superseded by the goal of meeting basic human needs. As following the Industrial Revolution when countries of the North grew prosperous at the cost of severe environmental degradation, cities of the South are now seeking the same path toward wealth creation. This focus is readily understood in cities such as Nairobi, Kenya, within which approximately two-thirds of the populace resides in slum settlements. Lacking virtually any medical care, public sanitation, or potable water, living conditions are deplorable. Research and practical applications focused on providing basic necessities of life have inevitably concentrated on poverty reduction strategies and the economic underpinnings of sustainability.

Cities of the Global North

In contrast to their southern counterparts, sustainability efforts in the typically wealthier cities of the global North concentrate more on the "green agenda" of environmental stewardship. Over the past decade, and typified by the likes of Berlin, Germany, and Montreal, Canada, most developed cities have experienced only incremental population growth. Still others, such as Detroit, Michigan, are noted for outright population decline. With no concern over any dramatic increases in population, cities of this realm have placed the environment at the core of their sustainability focus. Yet, the green agenda remains elusive for most cities and particularly for cities of the United States. For all the talk about sustainability, the American city remains hallmarked by low-density development and dependency on the automobile. As a result, current research agendas necessarily focus on the relationship between urban form and sustainability while highlighting those relatively rare U.S. successes.

  For the most part, research into cities and sustainable development identifies and assesses examples of sustainability in a sort of patchwork approach and with a near-singular focus on the environment. For instance, the cooling effect engendered by painting building rooftops white or covering them with grass and vegetation receives scholarly attention. Other studies focus on the greening of cities through the urban commons approach of compact planning, urban gardens, and multimodal transportation. Similarly, the "complete streets" movement aims to produce routes of travel that are convenient and safe for all users, not just those in the driver's seat. Still other studies analyze on the impact of congestion pricing, whereby automobile drivers are charged more to drive through city centers during peak hours. Indeed, the attention being paid to the concept of sustainability is evidenced by the fact that a simple Google search of "sustainable cities" currently generates nearly 1.1 million responses. Yet, while there are innumerable areas of research, a truly holistic research agenda into the sustainable city remains incomplete.

CUTTING EDGE

As cities in the developing world increasingly compete for resources, their counterparts in the United States and other industrialized nations are being forced to identify new approaches to urban planning, transportation, and design. Designing new buildings, and retrofitting existing ones, so that they meet "green" standards is being pursued so as to reduce energy consumption and therefore the building's ecological footprint. The green standards are known as *Leadership in Energy and Environmental Design* (LEED) and are set by the U.S. Green Building Council (USGB). Originating in the United States, LEED projects have since been established in more than 135 countries around the world. Research by Julie Cidell (2009) and others actively monitoring the number of LEED-registered buildings has provided thresholds and benchmarks through which cities may be rated. This venue for research is rapidly expanding as the number of registered LEED buildings has risen from just over a dozen in 2004 to nearly 1100 in 2013. According to the USGB website, buildings can meet LEED standards through various means. Use of sustainable building materials and resource- and energy-efficient designs all contribute to the building's assessed sustainability.

Further research is examining the growth of other local urban environmental efforts, such as the global growth of ICLEI-Local Governments for Sustainability. Founded as the International Council for Local Environmental Initiatives (ICLEI), the organization rebranded itself in 2003 so as to more adequately reflect its mission of sustainability. Presently, more than 1200 local governments are members of the organization, with cities in the United States accounting for nearly one-half of the membership. The efforts of the ICLEI-Local Governments for Sustainability, as well as the USGB, afford opportunity for research into city-by-city comparative analysis. Other initiatives likewise provide exemplars of sustainability, such as Sustainable Seattle in the United States or the Sustainable City Award in Europe. These examples of "best practices" highlighted in the research may provide opportunity for emulation by other cities.

While no fully sustainable city exists as yet, P. D. Smith (2012, p. 308) and others are following several developments that may ultimately demonstrate the feasibility of such a goal. Perhaps the most closely studied project is that of Masdar City, United Arab Emirates. With its first phase projected to be finished in 2015, Masdar City is scheduled to be fully operational by 2025 and is to encompass $6\,km^2$ and 45,000 residents. What sets this city apart is the fact that it will be fully powered by renewable energy sources. Accentuated by the largest solar power plant in the world as well as a geothermal plant, photovoltaic fields, and wind turbines, Masdar City will stand as the world's first carbon-neutral eco-city. Encouragingly, Masdar City is not alone.

Outside of Shanghai, China, the development of a new satellite city named Dongtan is under way. Also designed to be powered by renewable energy and largely car-free, Dongtan is ultimately to house upward of half a million people with an envisioned ecological footprint of just over 2 hectares per person. These examples provide both real-world as well as theoretical avenues for cutting-edge research into the sustainability of cities.

KEY ISSUES FOR FUTURE RESEARCH

While much research on the issue of cities and sustainable development has focused on the problems wrought by urban growth, forward-looking research is now considering cities as potential solutions to key issues in sustainability. With their typically higher densities, lower birth rates, and more efficient resource use than suburban or rural areas, cities offer perhaps unparalleled opportunities for sustainable living. Certainly not every new city can be designed, nor every existing city retrofitted, as a Masdar City or a Dongtan, but innovative steps can be taken to assuage environmental degradation and resource consumption. While such measures are likely to add to the costs of doing business, the price of doing nothing may well prove far more costly. Cost–benefit analyses that adequately capture both the overt and more intangible elements of sustainability must therefore be further explored and refined. As cost conscious or cash strapped city governments increasingly focus on the bottom-line, a straightforward measure of costs and benefits is all the more necessary to foster sustainable development.

In addition to new economic approaches to development, as well as innovative changes in urban design, there is need for entirely new lines of research. As noted by E. Eric Boschmann and Mei-Po Kwan (2008, p. 139), the absence of any major research agenda or any theoretical understanding of sustainable cities provides a clarion call for the social sciences. New research agendas that heed such calls and encompass all facets of sustainable development must be explored. Owing to the fact that sustainability requires modifications in virtually all facets of a city, a universal research agenda drawing from all potentially contributing disciplines is likewise required. Furthermore, key issues of sustainability must be targeted for more in-depth investigation. Among the most notable needs for further investigation is the impact of culture and "sense of place" on a community. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has acknowledged the realm of sustainable development to encompass economics and the natural sciences but has also accentuated the fundamental role played by culture. Specifically, the relationships between people and the values that they hold vary from culture to culture. Design for a sustainable city must therefore display cultural understanding and reflect cultural sensitivity.

One-size-fits all approaches, or heavy handed top-down approaches, are far less likely to succeed. Instead, future research must identify innovative ways by which sustainable development initiatives reflect the tremendous diversity between and even within cities. Sustainability initiatives must truly reflect the people and areas for which they are designed and must enhance emotional attachment between people and place. Ways to promote community ties and a strong sense of place that serve to facilitate efforts of sustainability must therefore be central to future research endeavors. These research lines are likely to encourage promising ventures into sustainability by city governments and planners, as land-use planning oriented around public participation and designed at the human scale is more likely to engender sustainable communities. Research veins into improved governance will also facilitate sustainability. The fragmented government structures that exist in the United States and elsewhere around the world currently serve as a deterrent to sustainable development. Competing governmental structures within a top-down hierarchy not only hinders coordination but it can also lead to inefficiency and inequity.

Equity itself is an issue that still has not been adequately addressed in either research or practical application. While purportedly standing as one of the three pillars of sustainability, it typically receives only nominal attention by cities pursuing sustainable development. The same cities that are active on the green agenda are virtually silent about inequalities in service provision, public safety, employment opportunity, and a range of other equity-based issues. Research that provides solutions to such issues as the jobs-housing imbalance could ultimately be incorporated into a city's sustainability agenda and affect meaningful change. Generated through research that captures public input, these solutions will likely prove far more soluble than any government directive. Local control and locally based plans that encapsulate the knowledge and culture of a place are unlikely to be met with the resistance encountered by a one-size-fits-all mandate from atop the governmental hierarchy. Therefore, research that is place-oriented but that takes a holistic approach to sustainability will be the key to success.

Cities are now home to more than half the world's population, they serve as the engines of the global economy, and nowhere is the juxtaposition of wealth and poverty or the environmental impact of development so apparent. When contemplating the future of the world, one need only contemplate the future of cities. Although currently unsustainable in form and function, cities paradoxically afford the greatest opportunity for successful sustainable development. Without doubt, pursuit of place-based and community-supported research agendas that provide new paths toward sustainability should be a goal for researchers throughout the social and behavioral sciences.

REFERENCES

Beall, J., & Fox, S. (2007). *Urban poverty and development in the 21st century: Towards an inclusive and sustainable world*. Oxford, England: Oxford GB Research Report.

Boschmann, E. E., & Kwan, M. P. (2008). Toward socially sustainable urban transportation: Progress and potentials. *International Journal of Sustainable Transportation*, *2*, 138–157.

Cidell, J. (2009). Building green: The emerging geography of LEED-certified building and professionals. *The Professional Geographer*, *61*(2), 200–215.

Economist Intelligence Unit (2011). *Asian Green City Index: Assessing the environmental performance of Asia's major cities*. Retrieved from http://www.siemens.com/entry/cc/features/greencityindex_international/all/de/pdf/report_asia.pdf

Smith, P. D. (2012). *City: A guidebook for the urban age*. London, England: Bloomsbury.

FUTURE READING

Bell, S., & Morse, S. (2008). *Sustainability indicators: Measuring the immeasurable?* London, England: Earthscan.

Bijl, R. (2011). Never waste a good crisis: Towards social sustainable development. *Social Indicators Research*, *102*, 157–168. doi:10.1007/s11205-0109736-y

Clark, W., III, (2010). *Sustainable communities*. New York, NY: Springer.

de Vries, B., & Peterson, A. (2009). Conceptualizing sustainable development: An assessment methodology connecting values, knowledge, worldviews and scenarios. *Ecological Economics*, *68*, 106–1019. doi:10.1016/j.ecolecon.2008.11.015

Douglas, I., Goode, D., Houck, M., & Wang, R. (Eds.) (2011). *The Routledge handbook of urban ecology*. London, England: Routledge.

Platt, R. (Ed.) (2006). *The humane metropolis: People and nature in the 21st-century city*. Amherst: University of Massachusetts Press.

Williams, K. (2010). Sustainable cities: research and practice challenges. *International Journal of Urban Sustainable Development*, *1*(1–2), 128–132. doi:10.1080/19463131003654863

CHRISTOPHER CUSACK SHORT BIOGRAPHY

Christopher Cusack is Professor of Geography at Keene State College in Keene, New Hampshire. He earned his MA and PhD from the University of Akron, Ohio. His teaching responsibilities include courses in urban geography and planning as well as geographic information systems. He has previously published on issues of community planning, urban sustainability, and regional development. Cusack is past Chair of the Regional Development and Planning Specialty Group of the Association of American Geographers from which he has been awarded the Distinguished Scholar Award. Traveling widely, Cusack enjoys photographing cultural and natural variations in the landscape.

RELATED ESSAYS

Neighborhoods and Cognitive Development *(Psychology)*, Jondou Chen and Jeanne Brooks-Gunn

Evolutionary Perspectives on Animal and Human Personality *(Anthropology)*, Joseph H. Manson and Lynn A. Fairbanks

Sociological Theory After the End of Nature *(Sociology)*, Robert J. Brulle

Theorizing the Death of Cities *(Political Science)*, Peter Eisinger

Causes of Fiscal Crises in State and Local Governments *(Political Science)*, Vladimir Kogan

Exploring Opportunities in Cultural Diversity *(Political Science)*, David D. Laitin and Sangick Jeon

Civic Engagement *(Sociology)*, Peter Levine

Modeling Coal and Natural Gas Markets *(Economics)*, Franziska Holz

Politics of Immigration Policy *(Political Science)*, Jeannette Money

Natural Resources and Development *(Political Science)*, Kevin M. Morrison

Economics of Renewable Energy Production *(Economics)*, Gregory F. Nemet

The Politics of Disaster Relief *(Political Science)*, Alexander J. Oliver and Andrew Reeves

The Social Science of Sustainability *(Political Science)*, Johannes Urpelainen