

## **Cities and Regions: The Urban Sustainability, Planning, Pedagogy, and Technology Nexus**

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**Abstract:** Two developing strands of a multidisciplinary literature provided an impetus for this paper: 1) the emergence of new regionalism, new urbanism, and smart codes that inform urban planning and design principles and practices for environmental sustainability, and 2) the diffusion of telecommunication and multi-media technologies that facilitate implementation of pedagogic principles in the “classroom.” The emerging urban planning and design paradigms anchor environmental sustainability issues firmly in place and space with an emphasis on the physical form of cities and regions, which, due to induced vehicular travel, is linked to greenhouse gases with consequences for climate change. Innovations that enhance learning in the classroom or the community increasingly embed and diffuse telecommunication and multimedia technologies. The intersections of urban sustainability, planning, pedagogy, and technology are briefly reviewed in this paper. It turns out that urban planning and design paradigms—particularly those with an emphasis on systemic knowledge, holistic views of both the natural and built environments, collaboration, communication, and reflective practice—synergize with environmental sustainability goals. Furthermore, these very features are ingredients for effective education for urban sustainability, particularly in conjunction with advanced telecommunication and multimedia technologies.

**Keywords:** Environment; climate change; new regionalism; new urbanism; education; technology; planning; urban sustainability

## 1. Introduction

The intersections of environment, economy, and social equity—the so-called 3Es—are commonly discussed in a vast literature of sustainable development. “Sustainable development” Maclaren (2009, 281) reminds us, implies a *state* (sustainable or durable) and a *process* (development). The latter is commonly gauged by a variety of indicators. An example of neighborhood level indicators is from the U.S. Green Building Council’s leadership in energy and environmental design (LEED-ND [usgreenbuildingcouncil.org](http://usgreenbuildingcouncil.org)). Rarely observed in discussions of the 3Es are emerging urban planning and design concepts that respond to the sustainability challenges of the increasing urbanization of the world population with an emphasis on durable qualities of the built environment. The new urbanism which emulates durable features of the old urbanism, such as compact, pedestrian-friendly urban form is an example ([cnu.org](http://cnu.org)). It turns out, urban planning and design concepts and practices, particularly those with holistic views of both the natural and built environments, synergize with goals of environmental sustainability. (For critiques of new urbanism, see for example Kotkin 2009.) Furthermore, the new regionalism reasserts early twentieth-century regionalism with holistic notions of the metropolitan region as an ecologic, economic, and social unit (Wheeler 2000, 2008, Calthorpe and Fulton 2001). The approach informs contemporary discourses of environment, social equity, and economic efficiency jointly—3Es—with a focus on urban sustainability (Geddes 1915, Mumford 1938, Calthorpe and Fulton 2001). Arguably, the metropolitan region is effectively regarded as a unit, the best scale at which to view and manage urban sustainability with all its natural and built complexity (Calthorpe and Fulton 2001; Wheeler 2000, 2008; Ross ed. 2009; Banai 2012). The holistic view of the metropolitan region ensures sustainability of the whole though each sustainable part, from building rooftop to the region (see also Birch and Wachter eds. 2008). The metropolitan region is regarded as the appropriate scale to assess sustainable urbanism ecologically, economically, and socially, from the urban core to the periphery, from local to the global scale (Pain and Hall 2006, Ross; Talen 2008, Hall and Pain ed. 2009). Planning and design contribute to the sustainability of the built and natural environment by breaking down a complex whole—the metropolitan region—into its interrelated parts—from building and neighborhood to city and region, from urban core to rural periphery, from local to global scales (see also Geddes 1915, Duany and Talen 2002, Farr 2008).

Sustainable *development* defined as a process also suggests the relevance of procedural planning and design theories that informs how to reach a desirable state and thereby also informs the construction of indicators of urban sustainability. The procedural contributions are modes of decision making that promote communication, collaboration, deliberation, reflection, and conflict resolution in decision making—arguably the very features of the planning and design paradigm in its communicatively active turn from the analytic rational model (Healy 1992, Innes 1998).

It turns out, procedural theories—particularly those with an emphasis on communication, collaboration, deliberation, and reflective practice—synergize with the very features of urban-sustainability education, particularly in conjunction with the advanced telecommunication and multimedia technologies made possible by diffusion of technological innovations in the home, workplace, and school (e.g., Mokhtarian 1991, Handy and Mokhtarian 1996). Furthermore, it turns out that the very procedural features of the communication theory of planning—

participative, collaborative, reflective, interpretive, holistic, creative and critical thinking—are increasingly regarded as effective pedagogic modes in general, and for urban-sustainability education in particular, especially in conjunction with advanced telecommunication technologies. Urban sustainability, planning, pedagogy, and technology are rarely discussed jointly in the literature. The intersections are briefly noted in four main parts: urban sustainability, planning and design, pedagogy, and technology. We conclude with implications for the planning and design of sustainable cities and regions.

## **2. Intersections of Sustainability, Planning, Pedagogy, and Technology**

### **2.1 Urban Sustainability**

Holistic notions of the metropolitan region address urban sustainability—from building and neighborhood to city, regional and global scales in one ecologic unit with interdependent parts (Calthorpe and Fulton, 2001, Banai 2012). According to the ecologic view, the treatment of urban sustainability of any part independently from others poses a critical limitation. Holistic views of the region and its component parts have their origins in nineteenth and twentieth-century European and American regionalism with unified concepts of the region (Geddes 1915, Mumford 1925, 1938). The new urbanism and new regionalism recognize the idea that urban sustainability is better approached holistically with interrelated “building blocks” of the metropolitan region (see also Calthorpe and Fulton 2001, Talen 2008). Ross (2009) adds the idea that the region is the effective spatial scale to sustain globally. The metropolitan region’s interrelated component parts are represented with “transect” and smart codes of new urbanism (transect.org; smartcodecentral.org). Transect and smart codes are “form-based” zoning regulations that guide planning and design of a unified metropolitan region—from the urban core to the peripheral suburban and rural areas (e.g., Duany and Talen 2002, Talen 2008). In contrast to conventional zoning that controls the use of land, transect codes control the form of buildings, streetscapes, civic and open spaces—the region’s building blocks. Transect codes emphasize the idea that it is important to proactively control the region’s durable building blocks that sustain the quality or livability of the built environment while accommodating varying uses, since the use of land is subject to change over time.

The transect is in effect both a master plan and a zoning ordinance that guides the long-term growth and development of the metropolitan region. While new urbanism's design plans are market driven and thereby predominantly implemented at the site and neighborhood scales, the transect provides an image of how the metropolitan region as a unified system is constituted over time. The transit-oriented development (TOD) model of new urbanism similarly provides metropolitan-wide plans that connect land use with transportation. Sustainable *development* as a process noted above informs the constructions of indicators that gauge urban sustainability over time and space. An example is US Green Building Council with leadership in energy and environmental design (LEED) rating, starting out at building and site scale, and recently including the neighborhood scale (usgbc.org).

### **2.2 Planning and Design**

**Actors.** The communication theory of planning underscores the communicatively active, reflective, creative, deliberative participants or “actors” in the planning process (Healey 1992, Innes 1998). However, actors “weigh in” differently in planning sustainable cities and regions. Among the participants are urban planners in their varied roles: as experts applying “technical rationality” in problem-solving and plan-making and as facilitators in public meetings or mediators in resolving disputes. Their work routines invoke the building blocks of the metropolitan region through development regulations, site plan, and master-plan reviews and approval, with implication for urban sustainability. Actors at the global scale, however, have celebrity status. Former Vice President Gore, former President Clinton, and Archbishop of Constantinople Bartholomew, also called the “Green Patriarch”, are examples of actors with global influence. They draw public attention to environmental crises, e.g., Gore’s grand narrative *An Inconvenient Truth* (2006). Their leadership influences others—citizens, policy makers, and politicians and their constituents—and promotes innovative ideas and technologies toward more sustainable practices. Similarly, President Mohamed Nasheed of the Maldives islands has drawn attention to the global environmental consequences of climate change. He held a meeting of his cabinet while submerged in the Indian Ocean to dramatize the likely loss of his country’s islands due to the rising sea level! The global environmental problem of climate change, he asserts, is a crisis of “international security” (Climate Crises 2009). The coastal zones from Southeast Asia to the Northeast coast of the United States are likely directly impacted by climate change. The United Nations (UN) and non-governmental organizations (NGOs) are global actors identifying issues and bringing the magnitude of the unabated environmental crisis to the world’s attention. The United Nations Environment Programme’s (UNEP) UN Habitat (2009) report assesses urban planning systems from a global perspective. The popular saying think globally act locally is relevant here as the environmental problem akin to similar planning problems are confronted and resolved at the local level with local public and political support (more on the public role in the “management” of the commons, critical to environmental sustainability, below). The media have a critical role in drawing public attention to local environmental problems like the presence of contaminants in the air, water, and land (see also Flyvbjerg 1998). *Erin Brockovich*, as depicted in Hollywood’s scripted film, is but one example of local leadership and community building confronting environmental crisis.

**Communicative Action.** Sustainable *development* defined as a process suggests the relevance of procedural theories of planning and design that inform how a desirable (durable) state is arrived at. The procedural theories are decision-making modes that promote communication, collaboration, deliberation, reflection, and conflict resolution in decision-making. These features represent a paradigm turn from a focus on technical analysis to communication and collective action (Healy 1992, Innes 1998). Habermas’s (1979, 1984, 1987) critical theory of society is influential in the planning paradigm turn to communicative action. Forester (1980) introduced Habermas to the field of urban planning in his “critical theory and planning practice.” Habermas set forth an “ideal speech situation” in communication. In the ideal speech situation, everyone’s relevant contribution is respected and the communication is free of distortion, coercion, and self-deception (Bohman and Rehg 2011; see also Bernstein 1976). Hall (1996) remarks, these are the very expectations in a democracy.

The practice of a value-laden sustainable development depends on communication and collective action. A significant participant in communication and dissemination of information is the mass

media that draw public attention to the particularities, challenges, and practices of sustainable development at the local and global scales (see also Flyvbjerg 1998 on the role of the media in planning and public policy). Like other theories of planning process, the communication theory of planning is criticized for the generic view of procedure independently of the substantive content (e.g., the goal/outcome of urban sustainability). However, the practice of sustainable development adds substantive content to the otherwise general and abstract communicative action theory.

The communication modes are wide-ranging with documentaries (e.g., national public radio and television, PBS, BBC), news media, and the Internet (social media), as well as regional and neighborhood public meetings. Habermas's pragmatic ideal condition of communication—legitimate, comprehensible, truthful, and sincere (see also Forester 1980)—is a gauge if compromised in the face of “distorted” views of urban sustainability. Controversy over global warming is one example of the “messiness” that plays havoc with the “ideal speech situation.” However, the variety of telecommunication technologies and the media at least promise a democratic environment of participation and deliberation even in the face of disparity of power and influence (see also Flyvbjerg 1998). In combination, the communication modes inform, engage, and empower individual and groups toward the substantive goal of a sustainable urban and regional development.

***Environmental Justice.*** Urban sustainability issues are manifested at the global and local scales with varying orders of magnitude. Some of the best-practice examples are creative local responses to the global factors—as in the case of the floating Bangladesh school (see BBC News 2009, Water World 2009). These cases are in contrast to incidences of environmental justice attributable to the mainly local conditions commonly reported in the literature—for example, the impact of abandoned and contaminated former industrial sites—“brownfields”—on nearby low-income neighborhoods. The floating school of Bangladesh and the floating house building of New Orleans are among creative design solutions to human-induced environmental disasters (see also Morphopedia 2009).

***Planning Process vs. Market Process.*** The institutional economist school of markets (Williamson-Ostrom type) favors the role of individuals and “self-governance” instead of the “central authority” of governments or corporations, such as public utility management of public goods (ecosystems) and aquifers that supply regional water (see also Brown 2008, Rubin 2008). The communication theory of planning characterizes the planning process by the democratic *and* communicative actions of actors—the general public, government, and the media. Both market and planning processes have modes of control—the market’s “invisible hand” and planning’s more visible federal/state/local governmental control. However, the institutional economists have moved beyond the communication theory of planning process in their differentiation of the roles of actors and modes of control (self-governance), particularly in the management of common goods that characterize the ecosystem. The institutional economist view provides an alternative to both market (privatization) and state (government) control of the commonly held natural resources in the face of the tragedy of the commons (see Ostrom 1990). Ostrom’s theories are particularly relevant to the discussion of governance of the regional city’s “commons” defined economically, ecologically, and socially as a unit, compatible with new

regionalism emphasis on cooperative jurisdictional governance instead of destructive market competition.

Arguably, self-governance is particularly enhanced with the media that draw public attention to local environmental issues, like the controversial siting of landfills or toxic sites. Similarly, the management of the “common good” with community self-governance is enhanced with the dissemination of information and the monitoring of environmental stewardship progress that are made possible by the availability of (Web-based) telecommunication technology as well as conventional print media. However, the emphasis in the planning process on actors as individuals or groups (“community organizing”) is a feature in common with the institutional economist’s view of market processes and governance.

**Best Practices.** These examples highlight the connection of the local and global in sustainable development beyond the metropolitan region. They include the restoration of ecosystem, mitigation of soil erosion and deforestation, organic food production, and forest preservation. The restoration of the marshlands of Mesopotamia is an example of the impact of global politics (geo-politics) on the local ecosystem (UNEP 2001). Creative survival practices in less-developed countries such as Bangladesh provide additional examples in the face of global, exogenous factors beyond local control (see BBC News 2009). However, these examples are in contrast to best-practice cases in more-developed counties with greater local control of global influences. Pioneered by Wangari Maathai, a Kenyan environmentalist, social activist, and Nobel Peace Prize laureate, the Green Belt Movement (GBM) in Kenya is an exemplary practice. Since its inception in 1977, the number of trees planted across communities in Kenya has exceeded 51 million, controlling soil erosion in critical watersheds ([greenbeltmovement.org/what-we-do/tree-planting-for-watersheds](http://greenbeltmovement.org/what-we-do/tree-planting-for-watersheds)). In the U.S., Appalachian Sustainable Development (ASD 2010), a not-for-profit organization in the Appalachian region of Virginia and Tennessee, is a sustainable development that facilitates food production and marketing at a local level via organic farming and processes wood for “green building” while conserving the forest ([Appalachian Sustainable Development, appsusdev.org](http://Appalachian Sustainable Development, appsusdev.org)).

### 2.3 Pedagogy

**Systems Thinking.** Interdependence is a feature of ecologic systems (see Lynch 1981). If the local is connected to the global and urban sustainability is inherently a multi-scale activity, then it follows that urban sustainability education is most effective if systems, or holistic, thinking is practiced in the classroom or the community. Local action is viewed in the context of the global, and, conversely, the global is viewed in a local context. Systems thinking, as Ackoff (1979) observed, is “synthetic”; it promotes an understanding from the larger to the smaller system. Systems thinking is particularly helpful to understanding the metropolitan region—the larger urban system—with a spatial structure that determines its interdependent smaller subsystems—the city, the neighborhood, the building site. Urban sustainability is effectively pedagogically approached when viewed at interrelated scales of the larger metropolitan region reflective of the view of ecology as a unified system. The urban sustainability challenges are posed differently at different scales, and thus are better understood and addressed if viewed holistically. To holistic thinking, Svanström et al. (2008) add critical thinking, communication skills, and ability to foster change in attitudes and values in sustainable development education.

**Community Education.** The idea that education or communal learning is a part of the practice of regional planning is emphasized early in the writings of regionalists like Mumford (1938). The resurgence of regionalism, called new regionalism in the twenty-first century, poses anew the metropolitan region as the effective unit within which urban sustainability issues are addressed—from land use, transportation, the environment, and housing, to tax equity and education (Calthorpe 1993, Wheeler 2000, Calthorpe and Fulton 2001, Wheeler 2008). However, as Lynch (1976) observed, one challenge is the difficulty to sense the metropolitan region as a whole in contrast to the city and neighborhood scale—more manageable spatial units for processing “visual memory” by observers—since a cognitive map of the whole region is necessarily partial due to the experience of it in limited time-space geography (see also Lynch 1960). If the metropolitan region as a whole is difficult to sense, it is still possible to think holistically about the interconnections—like transportation/land use/air quality—that render the region sustainable, even when not experienced everywhere or observed directly. (When distinguished geographer David Harvey regularly asks his students about where their daily breakfast comes from, he is engaging them in a kind of holistic thinking that raises awareness of the whole chain's sustainability, from the place where food ingredients are grown to the spaces of production, marketing, distribution, and consumption, even when the individual experience of each place or space is limited or practically impossible.)

## 2.4 Technology

**Collaboration and Communication.** Owing to its multifaceted complexity, the planning and design of sustainable cities and regions draws on a wide variety of disciplines (see also Birch and Wachter eds. 2008). As a “pilot” gauge of multidisciplinary demand for and interest in the subject of urban and regional sustainability on campus, we offered an elective “special topics” course in a graduate planning program (fall semester 2009). The graduate-only course attracted students with wide-ranging backgrounds, with majors in anthropology, public administration, public health, earth sciences, and city and regional planning departments. Originally designed to cater to students' growing awareness of and interest in local and global environmental issues, the course contents had a focus on the built and natural environment of cities and regions.

The course organization reflected the multi-scale approach to urban and regional sustainability education—from the site, building, neighborhood, and city, to regional and global scales (see also Birch and Wachter eds. 2008). The course design thus highlighted the notion that urban and regional sustainability is effectively approached pedagogically when viewed phenomenally at interrelated scales, just like the view of ecology as a unified system. The challenges are posed differently at different scales, and thus are better understood if viewed holistically.

An online, real-time, user-friendly platform with a flexible file format output (Google Docs) facilitated the collaboration, communication, and research documentation tasks of the course participants from various disciplines, just as the subject matter—sustainable cities and regions—fruitfully drew on expertise from different fields. A file utility in Google Docs (“revision history”) was helpful to the instructor for the sustained monitoring of each student's progress via a time log of individual student's contributions to group documents. The real-time feature indicated individuals (usernames) simultaneously editing the document, notwithstanding the unavoidable annoyance of the scrolling webpage when used concurrently by multiple users!

Furthermore, the revision history provided a record of individual contributions, which would otherwise pose a grading challenge in courses with group exercises and assignments. The online tool facilitated constructive evaluative comments with timely instructor-led feedback that continually enhanced student performance through individual and entire class-list email communication. The students positively responded to the format of the course, which allowed them to exchange ideas and insights while they collaborated to produce a semester-long term paper.

Web-based communication technologies—short documentary videos, podcasts, narrated slide or movie presentations, recorded video interviews, gaming, and simulation techniques and scenarios—about the topic of urban and regional sustainability provide tools to facilitate individual or small-team assignments in problem framing and problem solving. Exemplary models of effective pedagogy provide a means of assessing the potential use of multimedia tools that facilitate and optimize learning outcomes (e.g., thencat 2005).

We have only briefly noted the role of Web-based technology in urban sustainability education. Technology's impact on urban sustainability is immense. The nexus is addressed from a wide variety of perspectives and theories—e.g., telecommunications, telecommuting, and renewable resources—in a vast multidisciplinary literature that reflects the complexity of urban sustainability issues (for a start, see Mokhtarian 1991, Handy and Mokhtarian 1996, Randolph and Masters 2008, Birch and Wachter eds. 2008, Farr 2008, Birkeland 2008). The impact of technological advances on built and natural environments is a theme of an online planning conference ([www.planningtheworld.net](http://www.planningtheworld.net)). Lind's (2012) chapter in *State of the World 2012* is aptly titled, "Information and Communications Technologies Creating Livable, Equitable, and Sustainable Cities"—through data sharing, community mapping, and monitoring. ([www.worldwatch.org](http://www.worldwatch.org))

### **3. Conclusion**

Planning and design are fields with contested theories and politically charged debates. However, holistic, long-term worldviews of cities and regions are core theories with urban sustainability implications for the ethics of responsible, efficient, and just resource allocation and consumption in balance with natural and human-made resources alike, both now and in deference to future generations. Planning and design further the goals of urban sustainability through communication concepts of procedure (means) and substantive concepts of the metropolitan region (ends). The intersection of sustainability and planning, however, suggests the potential benefit of synergy. While informed by substantive and procedural planning and design concepts, urban sustainability is also a test of planning paradigms' efficacy, revealing weaknesses and strengths. Interestingly, the management of common goods, which include the ecosystem, has blurred the distinction made between planning and market processes, particularly with modes ranging from community organizing to institutional economist (Williamson-Ostrom) schools of planning and markets. Just as planning theory emphasizes communicative action, urban sustainability's emphasis on "actors" similarly highlights the notion that collective action—from individuals to organizations—is key to addressing the challenging issues and promising opportunities in planning and design of cities and regions in the twenty-first century.



The emphasis on actors as individuals and groups is not limited to those with a legacy in environmental sustainability—from Olmstead and Muir to Carson and McHarg, from Club of Rome to World Watch Institute. At each scale—the building, the site, the neighborhood, the city, the region, and the globe—individuals, organizations, and governments weigh in differently as “actors” in environmental management. Best-practices include those that represent local actions that are responsive to global environmental challenges.

Owing to the ubiquitous challenges of the environment, remarkably similar planning and design of technical innovations are evident in both less-developed and more-developed regions of the world. Also remarkably similar are the manifestations of environmental (in)justice, reflecting living environments of the poor whether in more- or less-developed regions of the world. If the cases of environmental (in)justice are the neighborhoods of the poor near abandoned, toxic, industrial sites—so called “brown fields”—of more advanced counties, then the poor residents of coastal zones with the threat of flooding linked to global climate change are the cases in less-developed counties.

Urban sustainability education is enhanced by advanced communication technologies. Learning outcomes reflect systems thinking, given the interdependence of the urban system as an ecologic whole with long-term worldviews of environmental sustainability. The metropolitan region and its component parts at multiple interrelated scales inform urban sustainability holistically with multidisciplinary perspectives—from the site and building to neighborhood, city, region, and global scale. Effective communication among actors facilitates the management of common resources. Finally, efficiency in resource allocation and consumption is gauged, above all, with environmental justice.

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