Urban environmental education

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Urban Environmental Education

As increasing numbers of people are living and experiencing the environment in cities, diverse urban environmental education practices are emerging. We conducted a systematic literature review and synthesis of academic publications to better understand the goals guiding environmental education practices in cities. Five broad trends in urban environmental education reflecting different goals were identified: (1) City as Classroom, (2) Problem Solving, (3) Environmental Stewardship, (4) Youth and Community Development, and (5) City as Social-Ecological System. The first two trends reflect broader currents in environmental education; other three trends emerged in large part from practices taking place in cities. This paper uncovers rich traditions of urban environmental education mostly in the American context, and provides a framework for this important area of educational practice and research.

Keywords   *urban environmental education, environmental education, cities, literature review*

INTRODUCTION

As the world becomes increasingly urban (Glaeser, 2011; UN-HABITAT, 2012), questions have been raised about the role of environmental education in providing experiences of nature in cities (Louv, 2011), in helping us to envision a sustainable city (Agyeman, 2003), and in encouraging urban residents to participate in restoring and creating green spaces and green infrastructure (Beatley, 2011). In other words, the field of environmental education is exploring how it can contribute to environmental integrity and human well-being in cities. A systematic analysis of publications on urban environmental education—from its roots over 100 years ago to contemporary approaches— will help to inform future practice and research.

Whereas the term "urban environmental education" was introduced in the 1960s and 1970s (e.g., Glasser, Stapp, & Swan, 1972; Reid, 1970; Shomon, 1969), related ideas date back to the first half of the 20th century (e.g., Bailey, 1911; Philpott, 1946; Renner, 1942). Initially, urban environmental education borrowed ideas from nature study, conservation education, and science education; later it was influenced by the environmental movement and focused on environmental and related issues; and more recently it has been inspired by fields such as environmental stewardship, youth and community development, and social-ecological systems. As increasing numbers of people are living and experiencing the environment in cities, diverse urban environmental education practices continue to emerge. Today, educators often refer to programs in schools, museums, and community-based and non-governmental organizations as urban environmental education, and scholars continue to use this terms in publications.

However, despite the popularity of this term, urban environmental education lacks a formal framework reflecting its goals and approaches. With the exception of several earlier reports, symposia, and curriculum guides (Australian Association for Environmental Education, 1984; Board of Education, 1960; Bureau of Sport Fisheries and Wildlife, 1968; Frank & Zamm, 1994; Leou, 2005; Strauss, 2013; Verrett, Gaboriau, Roesing, & Small, 1990), few attempts have been made to conceptualize urban environmental education. The wealth of scholarship and practices in urban environmental education—and their insufficient analysis—hinder the environmental education community's ability to think critically about practice and to design a research agenda based on explicit or implicit goals of urban programs. Thus, we undertook a systematic literature review and synthesis in order to define trends in urban environmental education starting with its roots over 100 years ago. Although our purpose for undertaking this review parallels that of Sauvé (2005), who has outlined 15 currents in environmental education with the dual goals of celebrating the richness of the field and offering points of reference for critical analysis of discourses and practices, our methods differed from previous work in that we undertook a systematic literature review (H. Cooper, 1998; Hart, 1998).

For the purposes of this paper, we define urban environmental education broadly to encompass any educational programs that focus on environmental learning and that take place in cities (cf. Davey, 1984, p. 52). However, the programs we uncovered during our search address multiple social and environmental issues and take advantage of cultural, ecological, and other resources unique to cities. One way to develop a deeper understanding of urban environmental education is examine the diversity of its goals. Thus, in this article we build a framework for urban environmental education by analyzing its goals as described explicitly or implicitly in the literature. While acknowledging the wealth of practices around the world, because we conducted our literature search in English, most of our sources focus on the United States and other English-speaking countries.

METHODS

Literature reviews are conducted to synthesize current knowledge (Ridley, 2008) and gain a new perspective (Hart, 1998), often attempting to retrieve the entire population of publications on a certain topic (H. Cooper, 1998). We reviewed academic publications including journal articles, edited book chapters, conference proceedings, and books that turned up in a search of the phrase "urban environmental education," while avoiding curricula, brochures, and publications that mention urban environmental education only tangentially. First, we searched this phrase enclosed in quotation marks in the ERIC educational research database, which turned up 34 results as of April 10, 2013. Second, we searched the same phrase in Google Scholar, and found 496 results as of the same date. Third, we realized that while the term urban environmental education was rarely used before the 1970s, understanding current scholarship and practice would be incomplete without looking at the historic literature; thus we also reviewed earlier publications focusing on urban environmental education that were cited in the literature uncovered through the online searches. More than 80 sources that matched our search criteria are included in our review, most of which focused on programs in the United States although several papers were from Great Britain and Australia. Any omissions of urban environmental education academic publications are not intentional. We also realize that other types of related education in cities are not covered by this review, such as education for sustainable development, outdoor and adventure education, and campus sustainability in higher education. Using the search results, we read all identified relevant publications accessed through the Cornell University Library, via interlibrary loans, and by contacting authors. The EndNote software was used to manage the literature.

We analyzed each paper by first asking, "What is/are the goal(s) of urban environmental education in this publication?" as opposed to initially focusing on educational approaches, history, theoretical foundation, or other characteristics. In cases where publications reflected more than one goal, we tried to identity the dominant goal. As we read the literature, we sorted sources into emerging categories reflecting different educational goals. We decided to call these categories "trends" because they are continuously evolving. In our analysis, initially a number of small trends emerged, several of which were combined. For example, "Youth Development" and "Community Development" were initially two trends, but were merged because the literature and practice in these two areas overlap. In another example, an initial trend "City as Nature" became part of "City as Social-Ecological System" because of the focus on cities as interdependent social and biophysical phenomena. We eventually agreed on five trends, which present a broad-brush picture of urban environmental education and help us reflect on practices in this field:
  (1) City as Classroom;
  (2) Problem Solving;
  (3) Environmental Stewardship;
  (4) Youth and Community Development;
  (5) City as Social-Ecological System.
Each trend is described and illustrated with example practices below.

TRENDS IN URBAN ENVIRONMENTAL EDUCATION

(1) City as Classroom
Urban environmental education often uses outdoor and indoor settings in cities to facilitate learning about nature, ecology, biology, environment, and related sciences. The goal of the City as Classroom trend is to foster environmental literacy or knowledge of the local environment, independent of whether or not it leads to pro-environmental behaviors. Typical programs within this trend take advantage of more natural ecosystems in cities, as well as street trees, parks, green infrastructure, industrial sites, and museums. Approaches within this trend include nature study, environmental monitoring, citizen science, and community mapping.

This trend was driven largely by concerns about science literacy and the recognition that experiential learning can enhance understanding of natural history and other aspects of science. Early writers described the educational value of labeling urban trees (Robinson, 1901) and the role of urban parks and vegetable gardens in fostering interest in wildlife and outdoors (Bailey, 1911). Later, educators were advised to teach about biology, natural science, and resource conservation by taking students to various urban sites including water supply and sewage disposal facilities (Wisconsin Department of Public Instruction, 1949, p. 36), urban nature trails (Polley, Loretan, & Blitzer, 1953), weed dominated vacant lots, urban schoolyards, and urban trees that could be surveyed and mapped (Weaver, 1955), forests near urban schools (Bathurst & Hill, 1957), and greenhouses, vegetable stands, and public markets (Bureau of Elementary Curriculum Development, 1958).

City as Classroom was developed further in the 1960s and 1970s, as described in publications about educational programs in New York City and elsewhere. Shomon (1969), one of the first authors to use the term urban environmental education, described nature centers exposing people to urban natural areas to foster a conservation conscience. Other authors suggested that people can develop appreciation for the natural environment

and a nature conscience, evaluate pollution, understand the dependence of cities on other ecosystems, and learn about urban infrastructure through such activities as observing soils, plants and animals around schools (Board of Education, 1960) and in urban nature/outdoor education centers (Hill & White, 1969; T. R. Tanner, 1974); sailing on a schooner within city waters and visiting zoos, natural history museums, aquaria, and urban parks (Blaustein, 1968) or vacant lots and abandoned buildings (Rillo, 1971); becoming aware of the location of fire stations and public transportation corridors (Spitzner, 1975); and independent projects in schools (Blackwelder, 1976).

Recent publications show that learning about ecosystems, biodiversity, and related science remains a goal of many urban environmental education programs. To achieve this goal, students engage in citizen science, outdoor investigations, inventories, inquiry-based activities, and visiting urban nature centers (Barnett et al., 2006; Barnett, Vaughn, Strauss, & Cotter, 2011; Dearborn & Kark, 2009; Fialkowski, 2003; Hashimoto-Martell, McNeill, & Hoffman, 2012; Johnson & Catley, 2009; Watson, 2006). Some high schools focus their entire curriculum around environmental studies and use urban ecosystems as their outdoor classrooms (Kudryavtsev, 2011; M. Weintraub, Park, & Jang, 2011). Expected or reported outcomes of such urban environmental education programs include environmental awareness (Fisman, 2005), environmental knowledge (Hashimoto-Martell et al., 2012), helping immigrant students to connect to their heritage (Bruyere, Wesson, & Teel, 2012), improving people's ability to perceive and understand urban environmental aesthetics (de Sousa Vianna, 2002), and learning about local history and communities (de Kadt, 2006, 2011). In sum, City as Classroom is an established trend in urban environmental education, whose goal is to facilitate learning about science and the environment, including students' local environment, through exploration of natural, historical, social, and human-made elements in cities.

(2) Problem Solving

The Problem Solving trend in urban environmental education was motivated by two concerns. First, it emerged as a response to urban environmental issues such as air pollution, lack of green spaces, public health, crime, and unequal distribution of environmental burden and access to ecosystem services. Second, it was inspired by the perception that other forms of environmental education were too focused on ecological knowledge or conserving natural areas outside cities, and had little relevance to the everyday experiences of urban residents. The goal of this trend is to mitigate ecological and related social issues, often through the development of environmental knowledge, attitudes and skills, which are assumed to contribute to pro-environmental behavior, environmental activism, and environmental restoration projects. The types of problems that this trend addresses have expanded over time from pollution, conservation, and infrastructure to encompass related social issues.

In the first half of the 20th century, researchers noted that cities offer opportunities to learn about environmental problems, such as the use of rivers as sewers or roadsides as trash damps, and their solutions (Renner, 1942; Renner & Hartley, 1940). Later, professionals reasoned that conservation education efforts should include urban residents because they are involved in decision-making affecting natural resources (American Association of School Administrators, 1951), while Donnelly (1957) pointed out that students can learn from firsthand experiences in urban neighborhoods and motivate their parents to help mitigate environmental problems. Notably, this trend attempts to make environmental education relevant to the everyday experiences of urban residents. Publications repeatedly emphasize that urban children and adults may have little interest in nature study, learning about ecology and wildlife distant from cities, or outdoor education in natural areas (Roth, 1961; Schneider, 1968). Rather, authors point out that city dwellers may be more concerned about air pollution, waste disposal, cleaning up urban rivers, human health, city planning, traffic congestion, lack of recreation areas, and experiences of urban life. Further, authors cite concerns about environmental justice, claiming that inner-city residents are overwhelmingly exposed to environmental hazards and experience unequal distribution of natural capital (Clark, 1972; Haluza-DeLay, 2013). Finally, authors claim that to engage city residents in environmental problem solving, urban environmental education should be relevant to individuals with different cultural, economic and ethnic backgrounds, and should respect diversity and civic culture (Verrett et al., 1990; B. A. Weintraub, 1995).

In addition to biophysical problems such as pollution, authors proposed that urban environmental education should address related social concerns including poverty, financial insecurity, youth unemployment, racism, drugs, violence, access to sites for skateboarding and other recreational activities, food supply, and human health (Frank & Zamm, 1994; Glasser et al., 1972; Verrett et al., 1990). These social problems could be addressed or learned about through such activities as field trips, meetings with professionals, art, theatre, development of student skills and competences, taking photos of attractive and negative aspects of inner cities, monitoring noise pollution, building birdhouses, planting shrubs, and other actions through which local residents improve their communities (Glasser et al., 1972; Verrett et al., 1990). Programs often take place in collaboration with neighborhood councils, faith-based organizations, community centers, housing agencies, and grassroots initiatives (EPA, 1972; Verrett et al., 1990). In sum, the ultimate goal of the Problem Solving trend in urban environmental education is to tackle environmental problems. As a response to environmental degradation, this trend may or may not call for action, but focuses on education about causes and solutions of environmental problems and related social issues such as environmental injustice in cities.

(3) Environmental Stewardship

In addition to addressing pollution and other environmental problems, urban environmental education has long been valued for fostering hands-on environmental stewardship or management of urban natural resources. Within this perspective, the goal of educational programs is to improve urban ecosystems, maintain green infrastructure, support biodiversity, and enhance ecosystem services by involving individuals and communities in hands-on environmental stewardship. A general assumption of this trend is that citizens or communities are able to design, restore, and maintain local urban ecosystems, often but not necessarily in collaboration with government agencies and non-profit organizations, and at the same time will learn about these ecosystems. Programs within this trend may integrate community-based service learning; for example, by involving students in neighborhood greening, urban gardening and farmers markets, designing and maintaining green roofs, rain gardens, and other green infrastructure, and restoring ecosystems such as estuaries that serve as oyster habitat.

The Environmental Stewardship trend has rich traditions all demonstrating that citizens in environmental education programs can make direct improvements to urban ecosystems. For example, in the 1950s, urban schools partnered with civic groups and city parks departments to play a role in tree-planting, beautification, and landscaping in neighborhoods, on school grounds, along streets, and in city parks (Weaver, 1955). Later, authors proposed that urban wildlife could be preserved by involving residents in the management of natural areas in cities (Gill & Bonnett, 1973). In addition to contributing to urban greening (Platt, 2006), urban ecological restoration projects are tools for educating students about urban biodiversity and increasing environmental literacy (Frank & Zamm, 1994; Ingram, 2008). Thus stewardship and educational goals may be of equal importance in some programs. Recent work in civic ecology has continued this trend in suggesting that environmental education in cities can be situated in civic ecology practices—including community forestry, community gardening, and community-based habitat restoration—thereby contributing to ecosystem services, biodiversity, and social capital while providing opportunities for environmental learning (Krasny & Tidball, 2009a, 2012).

Several authors described how environmental education programs can be integrated with stewardship. For example, educators involved children in environmental restoration activities along the Bronx River to help communicate the value of urban natural areas, improve wildlife habitat, increase students' academic achievement, and indirectly to involve parents in recycling and composting (M. J. Tanner, Hernandez, Hernandez, & Mankiewicz, 1992). Community-based organizations such as Rocking the Boat and Youth Ministries for Peace and Justice in the Bronx provided opportunities for youth to engage in stewardship activities including restoration of Bronx River habitats and cleanup of brownfield sites. Other Environmental Stewardship programs involved students in classroom and outdoor urban forestry activities to teach inner-city youth about forest management (Broussard, Jones, Nielsen, & Flanagan, 2001; Gilbert, 2006). In sum, environmental education has long been viewed as a vital part of urban environmental stewardship and restoration. This trend in the literature suggests that outcomes of environmental education may extend beyond individual learning and solving problems through changing policy to also encompass direct improvements to urban ecosystems and green infrastructure.

(4) Youth and Community Development

Programs inspired by the Youth and Community Development trend use the urban environment as a means to foster positive youth development and community well-being. They often take place at after-school, summer youth employment, and other initiatives sponsored by community development corporations, faith-based organizations, and community-based organizations. Whereas environmental knowledge and related outcomes may be useful byproducts, the focus is on learning critical life and citizenship skills, building social capital and community cohesion, improving social institutions, social norms, and cultural sensitivity, integrating immigrants into local communities, and empowering communities to take collective action.

Starting in the 1980s, authors began writing about how urban environmental education may nurture students' creativity and reaffirm positive aspects of their cultures, increase self-esteem and self-confidence, create positive attitudes towards learning and improve critical thinking, reduce dropout rates and gang and drug activity, promote active citizenship, and develop an understanding of power structures and the ability to influence policy and planning decisions (Breitbart, 1984, 1995; R. D. Cooper & Smith, 1989; Verrett et al., 1990; Welsh, 1993). Employing an asset-based model of youth development, Frank and Zamm (1994) called for building on and promoting positive youth attributes, such as resilience, social competence, autonomy, ability to solve problems, and a sense of the future. Urban environmental education is also considered as developing youths' work ethic and teamwork while increasing neighborhood food security and informing the community about environmental issues (Saveland, 1974; Schusler & Krasny, 2010; Schusler, Krasny, Peters, & Decker, 2009), as well as developing youth social capital (Krasny, Kalbacker, Stedman, & Kudryavtsev, submitted) and a sense of belonging to a community and mutual respect (Fialkowski & Williams, 1998). In a program in the Bronx, an urban river and related ecosystems are used to foster community-based art (Parrilla, 2006).

In this trend, individual and community development are closely linked, as when children or adults participate in decision-making in their communities. For example, programs may help city residents to articulate their environmental preferences and participate in collective advocacy and urban planning (Butterworth & Fisher, 2000);

bring together school children, educators, architects, environmental officers, and graphic designers to work on community architecture, community design and art, and other projects to serve community interests (Bishop, Adams, & Kean, 1992); or address local issues through action research and community problem solving (Wals, 1996). Engaging youth and adults in shaping their future through collaborative and life-long learning is consistent with "urban ecosystem education" as proposed by Hollweg et al. (2003) and with the "Growing Up in Cities" program, through which youth assess neighborhood conditions and influence environmental, social, and equity-related policies affecting their lives (Chawla, 2001; Driskell, Bannerjee, & Chawla, 2001; Lynch, 1977). Similarly, in programs in the Bronx, students learned life skills through engaging in data collection, public speaking, community organizing, remediation of urban rivers and brownsites, improving green spaces, and fighting for environmental justice (Kelley, 2005; Parrilla, 2006; Shiller, 2013). In sum, this trend considers positive youth development (Eccles & Gootman, 2002) and asset-based community development (McKnight & Kretzmann, 1996) as legitimate outcomes of urban environmental education.

(5) City as Social-Ecological System

The goal of this trend is to develop an understanding of cities as constantly evolving, integrated social and ecological systems. City as Social-Ecological System helps people view cities as legitimate ecosystems, where social and ecological processes are of equal importance. Programs motivated by this trend may use any number of educational approaches that help people explore, re-define, enhance, and celebrate urban sustainability and life, including though green design, photography, art, hands-on community and environmental stewardship activities, and learning from professionals and laypeople.

Whereas cities have traditionally been viewed as existing outside nature (Spirn, 2003) or the environment (Moffett, 2006), recent work underscores the importance of ecological alongside social aspects of cities. For example, "education for urban conservation" promoted viewing nature as integral to urban life, thus attempting to bridge the dichotomy between rural and urban ecosystems (Rohde & Kendle, 1997), and other urban environmental education publications emphasize that natural or ecological elements exist in cities along with built, social, political economic, cultural, and psychological elements (Carter, 1979; Howard, 1980; UNESCO, 1983). Further, Beatley (2011) suggested that cities provide nature-based settings for learning and recreation, which might inspire environmental stewardship. In line with this reasoning, urban environmental education programs in the Bronx contributed to ecological place meaning among youth, helping them to see cities as ecologically valuable places (Kudryavtsev, Krasny, & Stedman, 2012), while inner-city adolescents in Detroit were able to connect to and appreciate urban nature even without formal educational programs (Wals, 1994a, 1994b). McClaren (2009) cites authors in environmental education who consider cities as natural, although such views require redefining nature (Colwell, 1997).

In addition to legitimizing nature in cities, this trend emphasizes that different social and ecological dimensions of cities influence and depend on each other. For example, researchers claimed that "urban environmental education builds an understanding of cities as complex systems that blend nature and culture, and ecology and society" (Williams & Agyeman, 1999, p. 29). This idea is further expanded by viewing urban environmental education as an element of urban systems that may foster social-ecological resilience (Krasny & Tidball, 2009a; Tidball & Krasny, 2010, 2011). In fact, the systems view of cities is pronounced among several interviewed educators in urban environmental education programs in New York City (Lauber et al., 2012). Within this framework, scholars also claim that people learn about the city through various channels, including formal and informal educational programs sponsored by community-based organizations, media, and families (Nilon, Berkowitz, & Hollweg, 2003). Specific educational approaches in this trend include field-based surveys, art, cleanups, environmental restoration, school gardens, classroom teaching, formal presentations, street tree mapping, investigating road and building signs, exploring land use, and field trips to museums, zoos and factories (Carter, 1979; Dowd, 1978; UNESCO, 1983). In sum, this trend in urban environmental education is related to social-ecological systems thinking (e.g., Folke, 2006; Krasny, Lundholm, & Plummer, 2010; Liu et al., 2007) and green urbanism (e.g., Beatley, 2011; Beatley & Newman, 2009), and is helping people to learn about and contribute to our understanding of cities as integrated social-ecological systems through participation in collective decision-making and action.

DISCUSSION

Whereas the goals of environmental education are often stated in terms of fostering knowledge, attitudes, and behavior to enhance the environment and environmental literacy, and contribute to problem-solving (Marcinkowski, 2010; UNESCO/UNEP, 1978), delving deeper into the environmental education literature reveals an ongoing and often contested evolution of goals and practice (Fien, 2000; Jickling & Spork, 1998; Sauvé, 1999, 2005; Scott & Oulton, 1999; Wals, Geerling-Eijff, Hubeek, van der Kroon, & Vader, 2008). Disinger (2001) has traced the history of environmental education in the United States from its beginnings in the early 20th century nature study tradition (Bailey, 1911; Comstock, 1911), to conservation education addressing natural resource management as a response to

the devastation wreaked by the 1930s Dustbowl (American Association of School Administrators, 1951), and then to a focus on solving problems that emerged coincident with societal concerns about rampant air and water pollution in the 1960s (Disinger, 2001; Stapp, 1969). More recently, scholars have vigorously debated whether environmental education should have instrumental goals of solving environmental problems, emancipatory goals of developing an individual's ability to make decisions and participate in a democratic society, or should integrate both (Wals et al., 2008). Sauvé (1999) has referred to these conflicting views as modernist and post-modernist, and also presented an overview of 15 separate currents in environmental education (2005).

Our systematic analysis of the urban environmental education literature similarly demonstrated an evolution in goals and practice over time, reflecting societal and environmental changes as well as changes in environmentally-related scholarship and discourse (table 1). Practices consistent with any one goal or trend also evolved over time. For example, the City as Classroom trend has expanded from an early focus on nature study to encompass practices such as systematic data collection through citizen science (Dickinson & Bonney, 2012) and neighborhood inventories (Price, 2011). Although a conservation education focus such as that seen in more rural environmental education programs during the 1930s did not emerge as a prominent theme in urban environmental education, the Environmental Stewardship trend stemming from the 1950s, which focuses on hands-on tree planting and other forms of environmental restoration, is consistent with what one might have observed as part of the Civilian Conservation Corps and other Depression-era conservation education practices (Renner, 1942; Renner & Hartley, 1940). In contrast, the Problem Solving trend emerged concurrently with and strongly reflects a broader environmental education tradition of addressing pollution and other environmental problems that stated in the 1960s (Stapp, 1969).

Table 1. Trends in urban environmental education.

Trends	Goals	Educational approaches
City as Classroom	Facilitate learning about science, ecology, and the environment using urban outdoor or indoor settings	Nature study, citizen science and other forms of environmental monitoring, inquiry-based programs, community mapping
Problem Solving	Address environmental and related social problems	Environmental activism, conservation education, action research, environmental justice education
Environmental Stewardship	Foster community-based management of urban ecosystems and natural resources	Grassroots stewardship and education, civic ecology education, green jobs training, youth employment programs
Youth and Community Development	Contribute to positive youth development, asset-based community development, community organizing, and social capital	Youth development programs, adventure education, youth counseling, community development programs
City as Social-Ecological System	Develop an understanding of cities as social-ecological systems, re-envision how to manage cities, including for environmental integrity and human well-being	Any approaches to explore social and ecological aspects of cities: art, participation in green design and environmental events, learning from professionals and lay people

The last two trends—Youth and Community Development and City as Social-Ecological System—have stronger roots in practices specific to urban environments. Schusler and Krasny (2010), who conducted a study of the ways in which teachers and club leaders negotiate their role and that of their students in participatory environmental action programs, articulated the strong links between environmental education and positive youth development. Subsequent work in New York City has revealed how professionals leading after-school programs in the Bronx describe their work as fostering youth and community development, and talk about environmental education as a means to address these goals. Interestingly, when presented with the concept of sense of place, Bronx program leaders saw the connection between their work in youth and community development and sense of place (Kudryavtsev, 2013; Kudryavtsev et al., 2012). Subsequent research with an urban youth farming program in New York City (Delia, 2013) has attempted to link positive youth development and critical pedagogy of place (Gruenewald, 2003) through the notion of caring or cariño (Bartolomé, 2008; Noddings, 2005).

In contrast to trends that have emerged from environmental education and youth development practice, City as Social-Ecological System draws heavily from scholarship in coupled human and natural, or integrated social-ecological, systems. This trend reflects earlier work of Leopold (1949) who spoke of humans as belonging to a larger community that includes soils, waters, plants, animals, or collectively land; and Cronon (1995), who challenged our notions of pristine wilderness untouched by humans. More recently, this trend has been informed by scholars associated with the Stockholm Resilience Centre focused on social-ecological systems resilience (e.g., Berkes, Colding, & Folke, 2003; Ernstson et al., 2010; Gunderson & Holling, 2001) and with the NSF Urban Long-

Term Ecological Research sites (Grimm, Grove, Pickett, & Redman, 2008; Pickett et al., 2007; Pickett, Cadenasso, & Grove, 2004). Because of its unique link to scholarship surrounding social-ecological systems resilience, including adaptive capacity and transformation in the face of ongoing and more sudden catastrophic change, this trend, albeit less developed than the others, positions environmental education as part of a larger discussion surrounding how cities will respond to climate change and associated more frequent and higher magnitude flooding, droughts, heat waves, and other disturbances (Krasny et al., 2010; Krasny & Tidball, 2009a; Tidball & Krasny, 2012).

In practice, urban environmental education programs usually combine more than one trend. For example, a garden-based urban environmental education program in Brooklyn (Morgan, Hamilton, Bentley, & Myrie, 2009) uses ideas from City as Classroom in teaching about science and gardening, and from Youth and Community Development in teaching youth public speaking skills. In another example from New York City, the Harbor School and Satellite Academy High School include classroom and outdoor learning about science and environment, and hands-on community gardening as well as culturing oysters for reintroduction into the city's estuary (Crestol & Krasny, in preparation; Kudryavtsev, 2010, 2011), thus integrating City as Classroom and Environmental Restoration. Youth participating in Bronx restoration projects also collaborated with other organizations and community members to advocate for transforming post-industrial blighted areas into green spaces (Parrilla, 2006), consistent with the Problem Solving trend, and the Garden Mosaics program engaged youth in community gardening as a means for connecting science and multicultural understanding, and inspiring local action to solve problems identified by elder community gardeners (Kennedy & Krasny, 2005; Krasny & Tidball, 2009b), thus incorporating ideas from all five trends. Finally, an ecological perspective of urban environmental education would suggest the interaction of various trends, practices, and other elements of the social-ecological system (Tidball & Krasny, 2010, 2011), at times reinforcing each other through feedback mechanisms. For example, an intergenerational program may use environmental restoration to promote youth and community development and the social connections and trust formed through this program may foster further engagement in environmental restoration, thus enabling participants and their community to build further trust and social connections (Krasny et al., submitted).

Unavoidably, a number of relevant practices were not uncovered through our literature search, which was limited to English language papers found using the search term "urban environmental education" in the ERIC and Google Scholars databases, and earlier literature cited in these papers. For example, there is an emerging tradition of urban outdoor adventure education (Fouhey & Saltman, 1996) and urban multi-cultural environmental education (Krasny & Tidball, 2009b; Shava, Krasny, Tidball, & Zazu, 2010), and scholars have described the importance of critical pedagogy of place (Bowers, 2002; Greenwood, 2009; Gruenewald, 2003), both of which are highly relevant to urban settings. Further, we are aware of multiple urban environmental education practices in African and Asian countries, including hands-on restoration of nature preserves in Cape Flats, South Africa; natural and cultural history programs along the recently daylighted Cheonggyecheon River in Seoul, South Korea; and pond restoration and dragonfly monitoring in Japan (Krasny, Lundholm, Lee, Shava, & Kobori, in press). These practices would fall into the Environmental Stewardship, Youth and Community Development, City as Classroom, and City as Social-Ecological System trends. Yet it is possible that further research on urban environmental education in other countries such as those in Africa and Asia, and using search terms in different languages, would reveal additional trends. It is also possible that the term "urban environmental education" is predominantly an American construct, and researchers in other countries may prefer different terms, whose search would provide a wider understanding of environmental education in cities. Finally, this paper does not address contentious issues about definitions nor does it prioritize one trend or goal over another. Rather, we define urban environmental education simply as environmental education that occurs in cities. Whereas at first glance this definition may appear to align our work with education *in* the urban environment, the various trends we uncovered also are consistent with notions of education *about* and *for* the environment (cf. Lucas, 1972).

CONCLUSION

Similarly to other classifications of environmental education based on philosophical, pedagogical and related perspectives (Disinger, 2001; Fraser, Gupta, & Krasny, 2013; Lucas, 1972; Monroe, Andrews, & Biedenweg, 2007; Sauvé, 2005; Schulze, 2005), the goal of our typology of urban environmental education is to foster reflection and conversations about practice and scholarship among educators, researchers, and decision-makers. Environmental education and youth and community development professionals may benefit by using the five trends to reflect on and in some cases adapt their own goals and practice. Researchers may use our typology to start framing discussion about urban environmental education goals, practice and related research questions. Further, a growing number of university urban environmental education courses and degree programs may be able to use this work in training future educators and researchers. Finally, by presenting an analysis of urban environmental education trends, we hope to stimulate a discussion among opinion and policy leaders about the role of environmental education in addressing urban transformation, adaptation, and sustainability.

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