

Community Forestry and Environmental Research Fellowship
**Urban Environmental Education and Restoration:
Nurturing Environmental Stewards in the Bronx**
Pre-Dissertation Project 2008 Final Report

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Contents

Introduction

Acknowledgements

1. Summary
2. Pre-Dissertation Research 2008
 - 2.1. Initial Ideas
 - 2.2. Participatory Research Framework
 - 2.3. Community Partner Organizations
 - 2.4. Results and Conclusion
3. Dissertation Research 2009/2010
 - 3.1. Conceptual Framework
 - 3.2. Research Questions
 - 3.3. Research Methods
 - 3.4. Benefits for the Bronx Communities
4. Next Steps
5. Literature Cited

Acronyms

CBO	Community-based organization
CFERP	Community Forestry and Environmental Research Partnership
EE	Environmental education
PBE	Place-based education
PR	Participatory research
SOP	Sense of place

Introduction

“By bringing our communities together, and helping them to enjoy their resources, and helping them feel a connection to it, we hope that they will want to stay involved, and learn to protect it.”

—Anne-Marie Runfola, Deputy Director of Programs, Bronx River Alliance 2008

About 80% of people in the U.S. are living in urban and sub-urban areas (McKinney, 2002), which are often viewed as “*sources of ecological disvalue (...) as a product of human intentions*” (Light, 2001). As a result of this attitude, enhancing ecosystem services and biodiversity in cities have been often ignored (Alfsen-Norodom, et al., 2004). At the same time, SOP of urban residents, or connection between them and the environment is diminished (Orr, 2005), especially in inner-city communities (Elmendorf & Rios, 2008). Community involvement in restoration of and education about the environment, however, has a potential to ensure long-term success of restoration efforts, especially in urban systems (Ingram, 2008; Tanner, Hernandez, Hernandez, & Mankiewicz, 1992), and to reconnect people with the natural environment (Ryan & Grese, 2005).

For decades the Bronx River, the lower portion of which cuts through some of the most underserved and disadvantaged communities in the U.S., was a dumping site for raw sewage. Construction of expressways and industrial facilities distanced the Bronx River communities from the River itself and destroyed many natural sites along its way. But now steps are being taken by community members to restore ecosystems in and around the River and reconnect inner-city residents with nature in the Bronx River watershed. Based on the principle that people are experts on their local environment, several environmental CBOs in the Bronx strongly believe that Bronx residents, including the younger generation, are able to improve their own neighborhoods. By involving youth in PBE programs, this type of education not only plants the seeds of environmental leadership, stewardship and responsibility in youth, but also tries to restore the environment, and to strengthen ties between communities and urban nature. This research project will attempt to evaluate the impact of PBE on restoration of urban ecosystems and determine whether it strengthens a SOP in youth.

This report describes the evolution, implementation, and results of my research during the summer of 2008. Additionally, I am using this report as an opportunity to:

- discuss and share ideas about this research with educators and members of the broader Bronx community,
- reflect on the participatory part of this project, and
- develop a framework for writing a dissertation proposal.

My personal goals in this project also include: a) contributing to environmental restoration and education programs in underserved communities in the Bronx, b) building long-term professional relationships with the Bronx environmental CBOs that will extend well beyond the timeframe of this project, c) learning jointly with Bronx educators and other community members how to conduct PR projects.

Acknowledgements

I express my deep gratitude to all the people who have supported this project in numerous ways. I am especially grateful to my advisor Dr. Marianne Krasny for all kinds of generous academic support, and constant challenging and encouragement. My thanks also go to other members of my committee, including Dr. Richard Stedman, Dr. Scott Peters, and Dr. Mark Bain.

I am truly fortunate and honored to receive a pre-dissertation fellowship from the CFERP program, which enabled me to conduct initial research in the Bronx. I also would like to thank the CFERP program for creating a community of scholars who conduct PR projects, and for fostering the exchange of ideas during a workshop in Vermont. Conversations with members of the steering committee, other fellows, their community partners, and local people in Vermont about PR were a very inspiring and meaningful experience for me, and have helped my research to take shape.

I am extremely privileged to work with and learn from educators and community leaders in the Bronx, and to be involved with them in documentation and reflections about education and restoration practices. I would like to sincerely acknowledge the participation of the following educators and community organizers: Anne-Marie Runfola, Damian Griffin, Anthony Archino, Annette Williams, Adam Liebowitz, Jennifer Plewka, and Stephen Oliveira. Each of these people influences the direction of this research project. Their experiences and dedication to environmental restoration, long-standing commitments to serving their communities, and their approaches to community-based EE are truly inspirational. I also would like to thank Gretchen Ferenz at Cornell Cooperative Extension-NYC for introducing me to environmental issues along the Bronx River through the “Rivers Lost, Resources Rediscovered” course.

Finally, I extend my thanks to all community members, volunteers, and young participants of education and restoration programs who I met in the summer of 2008 and January of 2009 in the Bronx, and who were generous to share their perspectives on EE and restoration in the city. I hope that our community of practice driven by common goals and shared interests will become even stronger next year during the next phase of this research project.

1. Summary

In summer 2008 I started a PR project with educators from six environmental CBOs in the Bronx River watershed in NYC who organize EE and restoration programs for inner-city youth. These organizations are the Bronx River Alliance, Youth Ministries for Peace and Justice, Rocking the Boat, A.C.T.I.O.N. at the Point CDC, the Phipps CDC, and Sustainable South Bronx. In 2008 my tasks were to:

- 1) Identify research questions for the next phase of this project, which are related to urban EE and restoration, that are theoretically sound and practically useful for communities, and
- 2) Build rapport and trust with community partner organizations and augment my understanding of environmental, geographical, cultural, institutional, and other dimensions of social-ecological systems in the Bronx, which are important for PR.

Initially my proposal sought to build a conceptual model of urban EE programs. This focus, however, has been refined based on shared interests of educators in Bronx environmental CBOs. My decision to re-focus the next phase of this project was due to semi-structured interviews with seven educators from CBOs, participatory observations of their PBE programs during the summer of 2008, informal discussions with educators in January 2009, and a literature review. The following two research questions related to place were decided upon:

- 1) **What is the impact of youth PBE on urban ecosystems?**
- 2) **What is the impact of PBE on SOP in inner-city youth?**

During the summer of 2008 I also tried to move from an outsider to an insider position through participation in several volunteer-based community events, outreach, education, and restoration activities conducted by these organizations in different communities along the Bronx River. This helped me to experience urban EE and restoration first-hand, and to build relationships with community partner organizations. Some of my field observations are available online: thebronxriver.blogspot.com. This project will be presented at the World Environmental Education Congress 2009 in Montreal; all community partners are co-authors of this presentation.

Evaluation of relationship between PBE, urban environmental restoration, and SOP will help environmental CBOs in the Bronx to showcase the effectiveness of their programs as they try to build more sustainable communities, and to raise funds. This project also will generate different data related to youth-led environmental restoration including an online GIS database that maps the results of restoration activities, as well as photographs, narratives, and a website. CBOs, environmental educators, youth, and the broader community in the Bronx will use these data to strengthen local expertise in EE and restoration, coordinate collaborative projects, consolidate information about restoration in the Bronx River watershed, support their PBE programs, and increase the recognition of youth PBE programs in improvement of the environment in the Bronx. The Cornell University Institutional Review Board for Human Subjects approved this project (Protocol ID#08-07-008).

2. Pre-Dissertation Research 2008

2.1. Initial Ideas

When I applied to the CFERP program in early 2008, I was interested in creating a logic model of urban EE programs in the Bronx, which would help CBOs in the Bronx to design, conduct, and evaluate goal-driven education and restoration projects. This interest was based on conflicting goals between traditional EE and urban place-based EE. Traditional EE programs focus on development of certain knowledge, skills, and attitudes in youth, which presumably lead to environmentally responsible behavior of individuals (Hungerford, 1990; Hungerford & Ben Peyton, 1989; D. H. Knapp, Volk, & Hungerford, 1995; Simmons, et al., 2004; UNESCO, 1977, 1991). This project, however, was interesting theoretically because educational programs related to the environment in the Bronx are trying often to achieve different goals, such as engagement of communities in environmental restoration, and reconnecting residents with nature. Meanwhile, I found that constructing a logic model would not be very helpful for these particular Bronx-based CBOs. While still concentrating on youth education programs, educators and I decided to modify the original focus of the following phase of this project to make it more useful for CBOs.

2.2. Participatory Research Framework

This project is using the PR framework. One essential characteristic of PR involves addressing questions that are identified by community members and that are important for a specific community (Greenwood & Levin, 2006; Herr & Anderson, 2005; Pereda, Ángel de Prada, & Actis, 2003; Stoecker, 2004; Strand, Marullo, Cutforth, Stoecker, & Donohue, 2003; Wilmsen, 2005, 2008; Wulfhorst, Eisenhauer, Gripne, & Ward, 2008). In summer 2008 I used semi-structured interviews with educators from six environmental CBOs in the Bronx and participatory observation of their environmental events in order to identify research questions that are important to all of my community partner organizations. To find shared topics of interest in these CBOs, which would inform research questions of this project, I transcribed interviews and used Atlas.ti software to organize potential research themes.

Some authors propose that researchers engaged in PR need to involve themselves in various activities and tasks with community partners to build trust and establish rapport (Yamaguchi, 2007). Also, from an anthropologist's point of view, besides watching and asking, one needs to experience physical and emotional involvement in projects led by community parties (Heron & Reason, 2001; Wright & Nelson, 1995). My interaction with CBOs extended beyond doing interviews and discussing future research through participation in several educational and restoration activities, especially in the case of the Bronx River Alliance. Next year I plan to help the VOICE youth group (which brings young participants of education programs from several of my community partner organizations) with web development so that they can share their ideas about EE, restoration, monitoring and activism with the larger community.

PR stresses the importance of different ethical considerations, which extend beyond regular requirements of institutional review boards. For example, while collected materials, including photographs and interview transcripts, are safely stored in researcher's data files, they belong to the person providing this information (Cooke, 2004). In summer 2008 I tried to share, to the greatest extent possible, photographs from different events and interview transcripts with participants of this project. It is also important to involve community partners in data analysis and presentation of results. In my case, all educators from community partner organizations are co-authors of a presentation about this project that will be in the World Environmental Education Congress in May 2009.

PR also requires that researchers actually reside for an extended period of time in a community where they conduct research (Russell & Harshbarger, 2003; Wright & Nelson, 1995). Following this advice, I rented a room in the South Bronx and lived with a Spanish-speaking immigrant family, and often I bought food in Mexican stores. PR also suggests that researchers have to have some local language skills when they do investigations within the community-based restoration context (Russell & Harshbarger, 2003). Spanish is the first language of many residents the Bronx, so I learned Spanish at Cornell University to prepare for this project.

Often community and academic needs are seen as antagonistic, but in the PR framework this is explained as a "creative tension" (Stoecker, 2004). Luckily, we found research questions that are both relevant and interesting on both the community and academic level. Some authors also say that it is very important that chair and committee members must be comfortable acknowledging the student's multiple roles and suggesting appropriate epistemological and methodological approaches for the study (Herr & Anderson, 2005). Fortunately, my committee understands and supports the PR framework.

2.3. Community Partner Organizations

In summer 2008 I worked with seven educators from six not-profit environmental CBOs to formulate research questions for the next phase of my project. All six organizations are similar in terms of their 1) geographical location, 2) focus on community-based environmental restoration, and 3) youth PBE programs that include restoration activities. We do realize that the term "place-based education" can be a loaded term – for example, Knapp (2008) offers more than ten different other terms that describe PBE. We are using the term "place-based education" because it is used by educators in the Bronx to refer to education programs where local youth participate in environmental restoration, monitoring, and activism.

These CBOs are working along the eight-mile section of the Bronx River (Figure 1). Some organizations work with environmental issues in a particular community – for example, the Point CDC works with residents and ecosystems in the Hunts Point section of the South Bronx – while the Bronx River Alliance works on restoration of the entire River and its watershed. These CBOs have various environmental programs, including youth PBE programs with a strong emphasis on learning through participation in

restoration activities. For example, youth in these programs participate in ecological restoration of urban forests, parks, riparian habitats, and oyster reefs, installation of green roofs, and street tree stewardship.

Finally, these organizations are collaborating with each other on a number of projects to restore the environment along the Bronx River as well as to reconnect people with the River and the natural environment in its urban watershed. With the exception of Sustainable South Bronx, which currently does not have a youth PBE program, five other CBOs will participate in the next phase of this research. Below are short descriptions of these organizations.

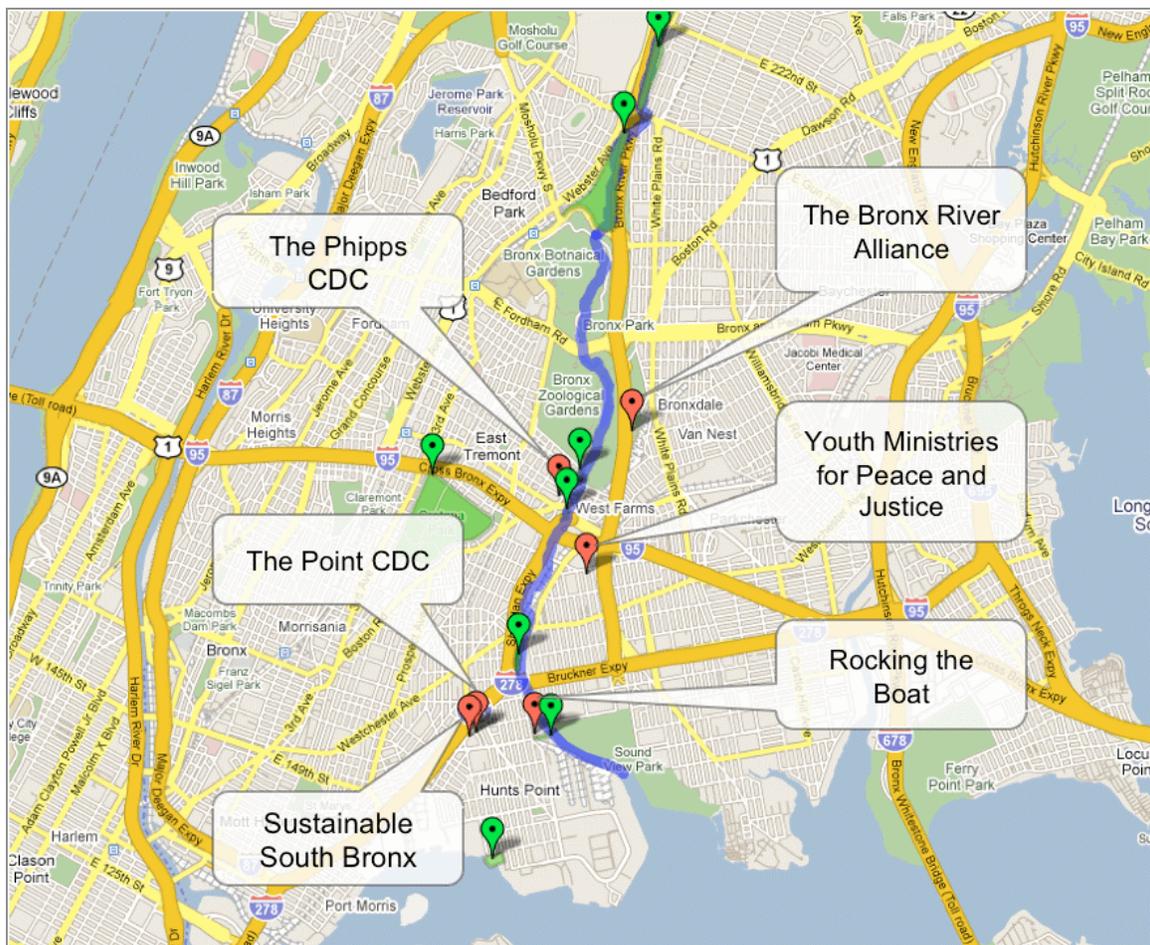


Figure 1. Research sites in the Bronx. Red placemarks show community partner organizations. Green placemarks are some of the parks and community gardens where these organizations conduct restoration and education activities with youth. The blue line indicates the Bronx River. (Map source: Google Maps)

The Bronx River Alliance
www.bronxriver.org

BxRA is a non-profit organization that works “to protect, improve and restore the Bronx River corridor and greenway so that they can be healthy ecological, recreational, educational, and economic resources for communities through which the River flows.”

Together with public and private partners, and community members, BxRA organizes ecological restoration and management in open spaces on and near the Bronx River, and provides recreation opportunities. The BxRA Education Program and other programs engage the Bronx's local activists, schools, and informal community groups in a variety of programs related to the environment, including environmental monitoring, restoration, and nature history learning. Nurturing environmental stewardship is a priority for BxRA: *"We work with over 40 local schools, youth and community organizations to engage residents in the development of the Bronx River Greenway and in the river's restoration. In doing so, we develop stewards who will protect the river and open spaces for the long term"* (Bronx River Alliance, 2008).

Youth Ministries for Peace and Justice

www.ympj.org

YMPJ is a non-profit organization in the South Bronx that develops leadership in youth who will be capable of leading change, inspiring them for civic participation in multiple community development issues, including environmental justice. Together with partner organizations, YMPJ plays a key role in the development of the Concrete Plant Park and in the decommissioning of the Sheridan expressway to bring more green spaces around the Bronx River (Reyes, Sneed, Oliveira, & Zidar, 2008). YMPJ is engaging more than 30 youth at a time during summer and school year, several of whom are paid and work for 25 hours a week on environmental stewardship and activism projects.

The Point Community Development Corporation

www.thepoint.org

A.C.T.I.O.N. at the Point CDC is a teen community leadership after-school education program in the Hunts Point neighborhood. *"The program engages young people who work to identify social and environmental justice issues facing the Hunts Point section of the South Bronx with the goal of creating and implementing ongoing youth-led solutions."* Youth who participate in this program take part in a variety of environmental projects to re-envision Hunts Point and to *"implement grassroots techniques in community planning and policy, and disseminate such information to the community."* Youth run environmental campaigns and environmental restorations.

Rocking the Boat

www.rockingtheboat.org

This organization involves high-school age youth in education programs to help them become empowered and responsible adults. Youth in Rocking the Boat participate in wooden boatbuilding and On-Water Education programs. About 24 youth in the On-Water Education program learn maritime skills, and participate in learning about and restoration of natural ecosystems, such as oyster reefs and native vegetation on riverbanks. Youth from Rocking the Boat, YMPJ, and A.C.T.I.O.N. at the Point participate in a group called VOICE, which helps to coordinate joint projects of their organizations.

Phipps Community Development Corporation

www.phippsny.org/programs.html

Environmental and Nutrition Education Program at Phipps CDC supports open green spaces and urban agriculture in the South Bronx. Phipps CDC currently maintains Drew Gardens, which “*has become a symbol of a community-led effort to restore, improve, protect, and preserve the natural environment in an at-risk community,*” and combines a multicultural community gardens, urban forests, community open space and a butterfly garden on the banks of the Bronx River. In summer this program hires 5 high school students to work on environmental restoration and agriculture projects.

Sustainable South Bronx (SSBx)

www.ssbx.org

SSBx promotes environmental justice through innovative, economically sustainable projects informed by community needs. SSBx is dedicated to the restocking of urban forests and green areas in Hunts Point, along the Bronx River greenway, and neighborhoods. While currently SSBx works primarily with adult residents, in 2009 it is planning to start a collaboration project with a middle school to engage young people in EE and restoration projects.

2.4. Results and Conclusion

In interviews I asked educators what are desired short-term and long-term outcomes or goals of their PBE programs. Educators mentioned several goals of their programs (Table 1), some of which also can be regarded as educational approaches.

Table 1. Goals of PBE programs in environmental CBOs in the Bronx.

CBOs	Community-based restoration	Connection with nature	Community activism	Positive youth development	Science learning	Community-based monitoring
BxRA	✓	✓			✓	✓
YMPJ	✓	✓	✓	✓	✓	
A.C.T.I.O.N. at the Point	✓	✓	✓	✓		
Rocking the Boat	✓	✓		✓	✓	✓
Phipps CDC	✓	✓	✓	✓		

All five environmental CBOs that currently have youth PBE programs are trying to 1) restore the Bronx River watershed and engage youth in restoration through PBE programs, and 2) reconnect youth with the urban environment. Education programs in some organizations also have other goals different from all other organizations. For example, while other organizations do not deal with the theme of urban agriculture, one goal of the Phipps CDC is to engage youth in urban agriculture.

I also asked educators about environmental issues that they are trying to address through PBE programs. All interviewees mentioned the following interrelated problems that youth are dealing with through restoration events, and sometimes through monitoring and activism:

- 1) Pollution of the Bronx River. A legacy of 19th century municipal engineering, the sewage system in the Bronx collects both wastewater and storm runoff in the same pipes. During periods of heavy rainfall the combined sewer system discharges excess wastewater, including untreated human waste and toxic substances from businesses, directly to the Bronx River because the water treatment plant can't handle it. About 60% of the Bronx River watershed area in the city is impervious surface (Crimmens & Larson, 2006). Increased green areas that absorb and transpire rainwater would mitigate the problem by reducing the volume of storm runoff entering the system.
- 2) Waterfront ecosystems. In many communities the remains of industrial facilities prevent the access to the River for residents, and riparian ecosystems are degraded.
- 3) Lack of green spaces in the Bronx River watershed. Urban forests, community gardens, and parks in the Bronx River watershed are not accessible within walking distance for recreation in many communities.

PBE programs in the Bronx environmental CBOs are trying to address the aforementioned problems. Educators described different tangible outcomes, which they are trying to achieve through education programs with youth (Table 2).

Table 2. Examples of ecosystem outcomes of PBE programs.

Organizations	Examples of ecosystem-related outcomes of youth PBE programs
The Bronx River Alliance	<ul style="list-style-type: none"> • Planting native species in urban forests • Invasive species removal • Water quality monitoring in the Bronx River • Erosion control and bank stabilization
Youth Ministries for Peace and Justice	<ul style="list-style-type: none"> • Urban street trees stewardship • Water quality monitoring in the Bronx River • Creating green roofs and rain gardens
A.C.T.I.O.N. at the Point	<ul style="list-style-type: none"> • Restoration of bird habitats on North Brother Island
Rocking the Boat	<ul style="list-style-type: none"> • Oyster reef restoration in the Bronx River
The Phipps CDC	<ul style="list-style-type: none"> • Maintenance of urban forests • Supporting a community garden • Maintenance of pollinator habitats

Educators from all five organizations mentioned that establishing a connection with a place is an important outcome of their youth programs in which they restore the environment. For example, educators talk about helping youth and the larger community to enjoy the River and other natural resources in its watershed by developing an emotional connection between youth and the natural environment, as well as fostering a general appreciation of nature. Although they did not explicitly talk about SOP, the concepts that they mentioned might be considered components of SOP within the literature of environmental psychology.

Two of five educators also expressed concerns that some communities and especially members of the younger generation do not consider the natural environment as part of their urban places/environment, or, even more, are afraid of anything untamed by man: “[youth] are fearful of the natural environment. They are uncomfortable, they don’t really wanna spend time here, and I’m really nervous for what for the world is going to look like in the next fifty years if this is the children that we are bringing up”, “A direct quote of one of my kids is ‘I don’t like nature, I’m afraid of nature, I don’t like being in the weeds.’” This resonates with a discussion in the literature that many inner-city residents may consider natural places dangerous (Bixler & Floyd, 1997; Ryan & Grese, 2005, p. 178). To some extent, this may be evidence that at least for some youth in the Bronx the natural environment is not part of their SOP. That is, it is not something that they are attached to, identify with, or are dependent upon.

We identified two topics that are of interest to five CBOs in the Bronx: urban ecosystems restoration and youth SOP. Interestingly, the discussion in the literature about PBE and volunteer restoration, which I summarize in the next section, also puts emphasis on environmental restoration coupled with nurturing the relationship between people and a specific place. The dissertation research project in 2009-2010 would build on the results of the pre-dissertation phase, and evaluate the impact of urban non-formal PBE youth programs in the Bronx River watershed on: 1) Physical place with the focus on ecosystem attributes of resilient social-ecological systems, and 2) SOP of youth using the framework of SOP, which addresses place attachment, place identity, and place dependence.

3. Dissertation Research Project 2009/2010

3.1. Conceptual Framework

In 2008 I found that two desired outcomes of PBE are common across all five organizations that I worked with: 1) youth-led restoration of urban ecosystems, and 2) reconnecting youth and communities with urban nature that can be described as a SOP. Interestingly, community-led restoration *and* different aspects of SOP are often discussed together in the literature (Kaplan & Kaplan, 2006; London, 1998; Long, 1998; Wilmsen, 2007), although their relationship often remains unclear. We will be looking at youth-led environmental restoration and youth SOP through the lens of PBE.

Place-Based Education

There is no agreed upon definition of PBE. For instance, Knapp (2008) gives a long list of different terms that have been used to describe PBE. Some of these terms stress service learning that produces tangible outcomes for communities, other terms highlight using place only as a backdrop for educational activities. Our definition of PBE will be close to Smith's one, who proposes that PBE is a type of education that "introduces children and youth to the skills and dispositions needed to regenerate and sustain communities" (2008). For the purposes of this project we will emphasize that in PBE, youth learn about and connect with the natural environment through participation in activities that contribute to improvement of urban ecosystems.

David Orr (1992) says that using place as an educational resource is inspired by John Dewey's ideas of learning by doing (Dewey, 1916), and by his ideas of connecting to a place (Dewey, 1915): "[out-of-school] experience has its geographical aspect, its artistic and its literary, its scientific and its historical sides. All studies arise from aspects of the one earth and the one life lived upon it." Today PBE is often associated with an educational style that values ecological sustainability and the reconnection of people with places that surround them. Some researchers and environmental philosophers – including Richard Louv, Louise Chawla, David Sobel, and David Orr – discuss PBE in conjunction with SOP. They recognize that PBE produces tangible environmental outcomes *and* changes perception of place at the same time (Figure 2). In the long-term, improved place/environment and stronger SOP reinforce each other.

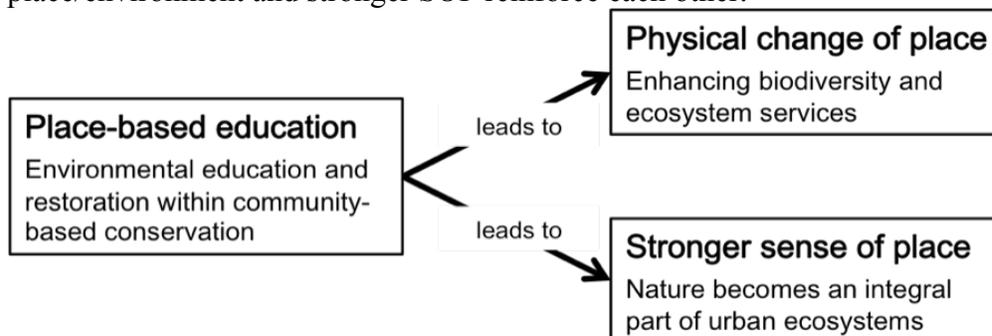


Figure 2. Relationship between PBE, environmental changes, and perception of place. This research will test the relationships that are indicated by arrows.

While the abovementioned researchers developed a general theory about PBE, there is no sufficient empirical evidence to support it. To prove the link between PBE activities and physical change of place, I propose to use existing indicators for assessment of ecosystems change (see discussion below). To prove the link between PBE and SOP, I propose to use methods of evaluation of different dimensions of SOP from the field of environmental psychology, which are rarely applied to the contexts of PBE or EE.

PBE and restoration of place

David Sobel (2005), one of the most notable proponents of PBE, views PBE through the lens of action education, and how it connects with Hart's action approaches (Hart, 1997). While children are interested in natural history, he argues that youth after the age of 12 are leaning towards actions "to save the world," and participation in restoration and other hands-on activities to improve the environment (Sobel, 1996). Researchers argue that PBE may lead to improvement of environmental quality – such as habitat restoration, invasive species control, and better air quality – and they also admit that there were not enough research trying to quantify these tangible impacts (Duffin, Murphy, & Johnson, 2007; Short, 2007; Sobel, 2005). While our research project will attempt to address this gap, I remain skeptical about the claim that there were very few projects to evaluate the impact of PBE on ecosystems. I need to do more research on this topic.

PBE and SOP

Referring to David Orr's philosophy that bridges SOP and PBE (Orr, 1994), Sobel also suggests that perception of place, or rootedness, is one of important outcomes of PBE. Because of close ties between PBE and SOP, sometimes the former is even called "sense-of-place education" (Heimlich, 2007). Louv's standpoint about PBE is similar to Sobel's: "Place-based education increases students' sense of stewardship and environmental consciousness and adds to their sense of attachment to place" (Louv, 2006, 2008). This statement, however, can be considered as a hypothesis for testing rather than a proved fact because it is not based on rigorous study of empirical evidences. Chawla (2007) also argues that "children cannot see the diversity of life unless they have a chance to venture out into it." Similarly, a sense of biophilia and a more general SOP in youth can't be developed unless they connect with ecosystems first-hand. So, it is possible to hypothesize that SOP can be developed as a result of engaging in any sort of ecosystem restoration.

Ardoin (2006) points that there are very few publications in the EE literature that refer to the theory of SOP. Publications in other fields, however, empirically demonstrate or otherwise argue that involvement in different forms of place-based restoration activities enhances participants' SOP. For instance, authors suggest that involvement in restoration builds connection between people and nature (Light, 2004; Ross, 1994), leads to place attachment (Beckley, 2003; Gobster & Hull, 1999; Moore & Scott, 2003), enhances attachment to their sites and natural world in general (Barlett, 2005; Ryan & Grese, 2005), and modifies volunteers' identity and connectedness to place (Kaplan & Kaplan, 2006). Also, there exist different dimensions of SOP which can be used in the field of PBE to articulate the link between place-based activities and SOP in participants (see below more details on this).

3.2. Research Questions

Preliminary research in 2008 and the literature review led us to two research questions:

- 1) *What is the impact of youth PBE programs on urban ecosystems?*
As we discussed above, Sobel (2005) and other authors suggested that there is not enough documented evidence to suggest that PBE directly benefits the environment. The first research question will address this gap in the PBE literature.
- 2) *What is the impact of PBE on SOP in youth?*
To ensure the rigor in the evaluation of the relationship between PBE and SOP, we will use different constructs from the theory of SOP (e.g., place identity, and place dependence).

This research project uses an innovative research strategy as it combines evaluation of both tangible landscape/ecosystems outcomes and intangible SOP mindscape outcomes.

3.3. Research Methods

Measuring impact of PBE on ecosystems

Ecosystems outcomes of PBE programs will be evaluated by measuring changes in desired characteristics of urban ecosystems (Table 3), which enable these ecosystems to deliver different services.

Table 3. Preliminary list of desired characteristics of urban ecosystems and corresponding ecosystem services. Adapted from Barthel 2005.

Desired characteristics of urban ecosystems	Ecosystem services
Accessible waterfronts	Creating opportunities for recreation
Balance between native and altered ecosystems	Providing opportunities for learning and recreation, enhancing resilience of urban ecosystems
Butterfly gardens	Pollination
Dominance of local species	Providing habitats for local fauna
Green roofs	Rainwater retention, habitat for birds
More and healthier trees	Rainwater retention and transpiration, air filtration, noise reduction, regulation of microclimate
Organic urban agriculture	Subsistence, offering opportunities for learning and recreation, rainwater retention and transpiration, supporting cultures
Oyster reefs	Water filtration, habitat for fish
Parks, natural walkways	Providing opportunities for recreation, learning, and sports activities
Reduced impervious surface	Retention of rainwater
Vegetated riparian buffers	Soil stabilization, providing habitats for animals, water filtration

We propose that ecosystems impacts of PBE programs should be measured in terms of enhancing desired characteristics of urban ecosystems, such as number of trees planted, impervious surface converted to forests or green roofs, and area of established butterfly gardens or oyster reefs (Table 3, column 1). We have identified other studies that are attempting to measure other environmental outcomes of PBE programs, such as air quality (Duffin, Murphy, & Johnson, 2007). But because innumerable factors are contributing to such environmental outcomes as air quality or health of residents in the Bronx, it would be infeasible to quantify the relationship between PBE programs and these types of outcomes. We also know that other similar studies focused mainly on outcomes that are directly serving only natural components of urban environment (Short, 2007), such as providing habitats for wildlife. In our study, however, we also will measure impact on ecosystems that enhance their direct services for urban residents, such as creating opportunities for recreation.

The final list of desired characteristics of urban ecosystems will be developed through reviewing ecosystem parameters in other similar evaluations (Barthel, 2005; Hunter, 2004; Milder, Lassoie, & Bedford, 2008), and through discussions with environmental educators and youth in my partner organizations. We then will adapt and use protocols developed by these and other researchers to describe changes in ecosystems as it results in restoration activities (more details to follow in the dissertation project proposal).

In addition to evaluating environmental outcomes by direct measurements, we will address the first research question by analyzing data originating from semi-structured educator interviews (Holstein & Gubrium, 1999; Siedman, 2006), narrative stories about development and philosophy of their youth PBE programs, and observation (Delamont, 2004; McCormack, 2004; Murray, 2003; Patton, 2002) and photographing restoration activities (Pink, 2004; Walker, 1999). Also, together with educators and possibly with young participants of BPE programs, we will produce a GIS database with data about youth-led restoration outcomes, which will integrate, display, and describe restored habitats, green roofs, oyster reefs, etc. To do this, we will use Google Earth to create a database, and Google Maps on the project's website to present these data, which will be accessible to the rest of the Bronx community. We will be using Google Earth technology because recently it has become not only a user-friendly tool for the general public, but also a sufficiently sophisticated GIS tool for scientific use (Conroy, Anemone, Van Regenmorter, & Addison, 2008).

Measuring impact of PBE on SOP

Although the literature on PBE and volunteer restoration often discusses SOP and similar concepts, the meaning of these concepts is rarely explained. We will build on the literature, which defines SOP as the subjective and emotional attachment people have to place (Cresswell, 2004; Kyle, Graefe, & Manning, 2005), or a positive emotional bond that develops between people and their environment (Stedman, 2003). More specifically, we will look at different dimensions of SOP, such as place identity, and place dependence (Stedman, 2006; Williams & Vaske, 2003). Place identity reflects the extent to which the environment or the natural environment is part of a person's self concept (Ardoin, 2006). Place dependence reflects the importance of a place in providing features and conditions

that support a person's specific goals or desired activities (Williams & Vaske, 2003). We will be interested especially in researching the extent to which youth are identifying themselves with and becoming dependent on natural features of urban landscapes, such as the River, community gardens, and urban forests.

We will conduct semi-structured interviews with youth who participate in urban restoration activities to describe how the natural environment is imprinted in their SOP, how participation in restoration influences their place attachment, identity, and dependence. It is possible that I would collect similar data from their peers who do not participate in urban environmental restoration, and compare these two groups. We will describe details of a general methodology and methods for these interviews in the actual research proposal. In addition, observation of restoration activities, photography, and possibly video recording (Ratcliff, 2003) will serve to support and explain data collected in interviews. We also may use a photo-narrative approach (Beckley, Stedman, Wallace, & Ambard, 2007) to triangulate this data.

Validity

Generally, validity is determined by the rigor of methodology. Triangulation is commonly used to reduce likelihood of misinterpretation and clarify meaning (Maxwell, 1996; Patton, 2002; Stake, 2005). In this research we will use multiple sources of data to answer research questions. Assessments of ecosystems impacts, educator interviews, narratives, photographing and GIS mapping are used to address the first research questions. Second research question also has multiple sources of data about the same subject, including youth interviews and observations of youth-led restoration activities.

Also, the ultimate test of validity of PR is relevance to practice (Friedman, 2001), or the reliability and usefulness of information about social phenomena (Greenwood & Levin, 2006; Ladkin, 2004). In other words, PR accepts knowledge created through a variety of methods as long as it serves the needs of communities. In this research we ensure that educators in environmental CBOs, youth, and other community members influence and participate in every phase of this project.

3.4. Benefits for the Bronx Communities

PBE programs, their young participants, and the broader community in the Bronx will benefit from this research project in the following ways:

1) *Measurement of environmental outcomes.* This research will document and quantify environmental outcomes of youth place-based programs, which will be useful, for example, in seeking funding from all sorts of investors.

2) *Strengthening the role of youth and the broader community in urban environmental restoration.* This research will document the positive and important role of young citizens in environmental restoration in the Bronx. In the future this may encourage other urban environmental programs to collaborate with youth and other community members on local environmental projects.

3) *Maps of environmental restoration projects.* This project will produce a GIS database for visualization of outcomes of youth environmental restoration activities in the Bronx. This repository will aggregate information on biodiversity, ecosystems, and other related

outcomes. Google Maps and Google Earth will be used because they provide a highly responsive and intuitive mapping, which can be used by participants for education, outreach, and other purposes, even after this project. Examples of successful mapping outreach projects, from which we will learn, can be found here: http://earth.google.com/outreach/case_studies.html

4) *Website*. We will create a website about youth PBE programs in environmental CBOs in the Bronx. It will document information about youth-led restoration outcomes, video and text narrative stories of educators about their PBE programs and impacts, GIS maps mentioned above, and other information that can be used by participants for self-determination and to reach out the larger community in the Bronx.

4. Next Steps

Before I go into the next phase of this research, I plan on accomplishing the following:

- 1) *Dissertation research proposal*. I will be writing a dissertation research proposal in January 2009. As of the first week of January 2009, I have already met with educators in environmental CBOs in the Bronx to discuss and develop research ideas described above. Their input is greatly influencing the direction of this research project.
- 2) *Conference presentation*. In May 2009 the results of the pre-dissertation phase will be presented at the World Environmental Education Congress 2009 in Montreal. Educators from all CBOs that participate in this project will be co-authors of the oral presentation made at this Congress. I may be accompanied to Montreal by some of these people to help in the presentation of this research.
- 3) *Website*. Before the dissertation phase of this research starts in summer 2009 I am planning to develop a website for this research project (www.UrbanEE.org), which will facilitate collaborative data collection, community mapping, and help share my progress and results with the larger community.

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