Social Innovation in Environmental Education:
Results and lessons learned from a five-year professional development program

Marianne E Krasny
Yue Li
Elizabeth Danter
Anne Umali Ferguson
Rupu Gupta

Legacy Product, EECapacity
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Introduction

Similar to technological innovations, social innovations are novel ways to address a challenge or solve a problem. What makes social innovations unique is that they are created explicitly for the public good—for example, new approaches to tackle obesity or new policies to improve public education. But social innovations are not only new practices or even products to meet social needs; they also can be new social relationships or collaborations that enhance our capacity to address future challenges. In short, social innovations are improved or new products, practices, and processes that “are both good for society and enhance society’s capacity to act” (The Young Foundation).

Environmental educators have historically created innovative practices to address challenges, such as developing conservation education programs in response to the devastation wrought by the 1930s Dust Bowl. Today, many environmental educators strive to develop innovative practices to address changing demographics, equity, climate change, and other social and environmental issues (Monroe and Krasny 2014). Research has demonstrated that social innovations, such as changes in educational practices, are likely to arise when people share diverse perspectives with others whose views differ from their own (Biggs et al. 2010). Thus, one path to developing innovative practices in environmental education is to provide opportunities for diverse professionals to exchange ideas about their practices and the challenges they face.

From 2011 to 2016, Cornell University collaborated with the North American Association for Environmental Education and the U.S. Environmental Protection Agency (EPA) to conduct the Expanding Capacity in Environmental Education (EECapacity) professional development program. EECapacity’s strategy for professional development was based on the hypothesis that creating “trading zones” for exchange of ideas and resources among diverse groups of professionals will lead to innovations in environmental education (cf. Rittel and Webber 1973, Mulgan et al. 2007). The goal of this report is to summarize what actually happened as we tried out this approach over five years.
Part 1. EECapacity: A Social Innovation Approach to Diversity in Environmental Education

Nearly thirty years ago, UNESCO (1990) identified the preparation of environmentally literate teachers as a top priority for improving environmental education. In 1992, EPA established the North American Environmental Education Training Program to offer professional development and strengthen the field of environmental education. Through partnerships with the government, university, private, and non-profit sectors, EPA’s program has provided training and produced resources for environmental educators for 25 years.

In 2011, Cornell University was awarded a five-year grant to conduct EPA’s National Training Program, which we called EECapacity. EECapacity’s goal was to transform the field of environmental education so that it would more closely reflect the urban demographics of North America. Over 80% of the U.S. population lives in cities, yet environmental education has historically been conducted in more pristine settings. Thus, EECapacity saw a need to create environmental education opportunities for youth and adults in urban areas.

EECapacity sought to address this need by leveraging an important but sometimes overlooked trend: the growing number of youth and community development professionals, many of whom are professionals of color, who engage youth and adults in environmental learning in cities. While much of the discourse about environmental organizations and diversity has focused on the lack of professionals of color in larger non-profit organizations and government agencies, we had observed a different trend in smaller non-profits and community-based organizations. For example, educators of color often guide youth in after-school programs, which in years past might have focused on arts or music, but today focus on environmental activities such as community gardening or tree planting. This emerging practice positions the field of environmental education to move ahead in an exciting new direction: an asset-based strategy that recognizes the novel approaches to environmental learning conducted by community-based organizations in cities, in particular, these organizations’ professional capacity in youth and community development. Reflecting this capacity and a global trend of seeing environmental systems as being tightly intertwined with social systems, EECapacity sought to create opportunities for environmental educators and youth and community development professionals to share practices and resources and to learn from each other. In so doing, EECapacity posited that both types of professionals would benefit and together they would create new products, practices, and processes—social innovations—that reflected urban demographics in the U.S.

The youth and community development professionals leading community gardening education and similar programs may not refer to their programs as environmental education. In fact, these professionals often state that their goals are youth or community development, and they use environmental activities as a means to achieve these goals rather than as a means to increase environmental literacy or change environmental behaviors. However, many of their practices reflect the Guidelines for Excellence in Environmental Education, such as hands-on,
inquiry-based learning, fostering citizenship skills, and understanding global connections and conflict. They also directly address EPA Priorities related to water quality, cleaning up communities, and environmental justice. For example, these practices engage youth and adults in restoring contaminated sites in urban parks, transforming blighted lots into community gardens, planting bioswales gardens next to parking lots, and monitoring water quality in urban streams. Further, these efforts incorporate activities of interest to and the learning styles of urban and ethnically diverse youth and adult audiences. EECapacity was based on the conviction that these new and emerging programs are an asset that the field of environmental education cannot afford to ignore in trying to achieve its mission of “environmental literacy and civic engagement” in a diverse society.

EECapacity hoped that by bringing different kinds of professionals together—or creating trading zones for ideas and resources—new environmental education practices reflecting our urban demographics would emerge (cf. Galison 1999, Mulgan et al. 2007). To this end, EECapacity conducted a series of face-to-face and online professional development activities including workshops, online courses, and fellowship programs, which were initially aimed at two groups of professionals: environmental educators who work in more natural settings with the goal to change students’ environmental behaviors and an emerging group of urban professionals who use environmental activities to build academic and social skills among urban youth and to enhance community wellness. As the program evolved, we brought in additional professionals such as natural resources managers, science teachers, and park interpreters, all of whom have expertise to bring to environmental education “trading zones.”
**EECapacity Initiatives**

11 state consortia created new practices addressing equity issues by connecting environmental educators, youth and community development professionals, and young professionals working in schools, community-based organizations, and other settings.

20 online courses offered on topics such as urban environmental education, climate change communication, environmental education research, community environmental education, military families and environmental education, faith communities and environmental education, and transdisciplinary approaches to addressing wicked environmental problems.

Four online learning communities produced eBooks on measuring environmental education outcomes, climate change educational resources, urban environmental education, and EE en Español.

Community Climate Change Fellows created and shared new practices, which they compiled into an eBook.

“Train the Trainers of Trainers” Fellowship helped environmental educators create online learning opportunities for other environmental education and youth development professionals.

Environmental education certification and accreditation supported states developing environmental education standards and set standards for accreditation of undergraduate environmental education programs.

Community environmental education workshops in cities across the U.S. brought together environmental education and youth and community development professionals to build environmental education practices that focus on community wellness.

eePRO website launched with extensive resources and networking opportunities.

New *Community Engagement Guidelines for Excellence in Environmental Education* developed.

*Urban Environmental Education Review* textbook published by Cornell University Press; 10 of 30 chapters available online as *Essays in Urban Environmental Education* and 30 short lectures from authors published as *Urban EE Colloquium*.

*Across the Spectrum: Resources for Environmental Educators* eBook and EEResearch videos help translate research for practitioners.

Environmental education eBook series launched by Cornell University Press. Short versions of the first four eBooks published online; topics include: environmental education outcomes, online professional development, climate change communication research for environmental education, and social innovation in environmental education.

Two ongoing social media groups for exchanging resources and ideas: Urban EE Collective and Global Environmental Education.
What is Social Innovation?

iPhones, driverless cars, drones, even the printing press—these are all innovations. We can easily see them as innovations because they are tangible products—we can touch them. We can also patent them. Counting patents produced in a country or in a city is one means of measuring how fast societies are developing technological innovations.

However, not all innovations are something we can touch. A social innovation is a new idea, process, product, practice, or solution that works for the public good (Nicholls and Murdock 2012, TEPSIE 2014). An example of a “product” social innovation is the *Guidelines for Excellence in Environmental Education*, which address the challenge of ensuring high professional standards in our field. “Process” social innovations create new social relationships and collaborations that enhance capacity for future action. For example, the Blue Sky Funders Forum created a network of donors to address the challenge of funding environmental education. Finally, “practice” social innovations are new educational approaches and discourses, such as those that address diversity. The key feature of social innovation is serving the public good in areas such as education and health. Whereas technological innovations also often serve the public, such service is not their defining characteristic.

Social innovations are “new ideas (products, services and models) that simultaneously meet social needs and create new social relationships or collaborations. In other words, they are innovations that are both good for society and enhance society’s capacity to act”

*The Young Foundation*

**Social innovations in environmental education are improved or new processes, products, and practices that address challenges faced by the field and that increase the capacity of the educators and of the field to address future challenges.**

*(adapted from BEPA 2011, Mulgan 2012, TEPSIE 2014)*

In addition to different types we see different levels of social innovations. Social innovations can occur at the level of the educational practice, the organization, a state-wide network, or even the field of environmental education as a whole. So an individual educator could change his or her environmental education practice to reflect the various ethnicities, faiths, or cultural values of program participants; a state association might develop new training and networking processes for addressing diversity; and the field of environmental education as a whole could change to more widely embrace ethnic, cultural, and economic diversity in its guiding documents and professional development activities.
Importantly, social innovations are not defined by their absolute novelty. Rather, they offer improved ways of addressing social problems relative to existing approaches and often involve new combinations of existing practices (TEPSIE 2014). And often the best way to find these new combinations is through trial and error.

*The premise of any social innovation is that the world is imperfect; that our knowledge of the world is incomplete; that creative innovation can achieve improvement; and that the best way to discover improvements lies in experiment...* (Mulgan 2012)

In the case of EECapacity, the challenge we identified was an increasingly urban population, which would benefit from more environmental education programs taking place near where people live—i.e., in cities. Thus, in this report, we focus on innovations in *urban* environmental education. However, the lessons learned are broader than the urban demographic challenge we addressed—for example, environmental education is badly in need of innovative practice to address the challenges of communicating about climate change and fostering effective adaptation and mitigation actions. Environmental education also faces a challenge of how to make its messages heard in rural, economically depressed communities. Regardless of whether the challenge relates to diversity, climate change, energy use, or any other so-called intractable or “wicked” problem, scholars have called for government and other funders to support citizens as they collaboratively create novel approaches, sometimes referred to as “grassroots innovations” (Rittel and Webber 1973, Seyfang and Haxeltine 2012, Ornetzeder and Rohracher 2013).

In some cases, social innovations empower specific target groups and thus challenge inequitable distribution of power and resources (TEPSIE 2014). In this way, social innovations can disrupt existing policies, norms, and everyday ways of doing business (Nicholls and Murdock 2012, TEPSIE 2014). By challenging the status quo, social innovations can generate a reaction among those whose views have dominated a particular field, leading to a period of conflict or turmoil. At the same time social innovations can foster discussion about difficult issues such as equity and climate change adaptation. Because environmental education practitioners and scholars work—and listen to concerns—in diverse communities around the world, they are uniquely poised to foster conversations about these and other challenging issues (TEPSIE 2014).
Measuring Social Innovations

So how do we measure social innovation? Let’s take an easy case—EECapacity Community Climate Change Fellows create a new eBook. We can simply describe this new product.

But the Community Climate Change Fellows also forged new relationships and collaborations. For this “process” innovation, we can measure changes in the types and strengths of relationships that were forged using a survey technique called social network analysis. You may have seen social network maps, which have circles or squares to represent people or organizations (called nodes), and lines between the nodes to show how often people exchange ideas or resources (ties). People responding to a social network survey indicate how frequently they contact other people or organizations and their responses are used to map the network. In EECapacity, we measured how networks changed as a result of environmental education professional development programs. We also interviewed program participants to explore in more depth how relationships were formed and maintained. The combined results from the social network surveys and interviews help us to understand whether the program created a process social innovation—in our example, new relationships and collaborations that enhance the ability of the Community Climate Change Fellows to conduct their current work and to create future innovations.

So we can measure products and relationships or networks, but what do we do about measuring innovations in actual environmental education practice? One approach would be to break down practices into their parts or elements, such as program goals, audiences, settings, teaching activities, and educational resources and ideas. Then we can survey and interview educators to ask if and how they changed any of these elements. Practice innovations consist of integrating new elements with existing ones or even new combinations of existing elements.

Finally, how might we measure changes in the field of environmental education as a whole? Given that EECapacity tried to create innovations in urban environmental education, changes in the way the field addresses diversity were of interest. So we asked national leaders in environmental education to complete an open-ended survey about any changes they saw in the field of environmental education, including changes related to diversity and conducting environmental education in cities.

In short, social innovation in environmental education can consist of new products, networks, and practices. Interestingly, networks are not only an innovation or outcome of professional development, but also a process by which new products and practices can be created. For example, EECapacity created opportunities for educators to exchange ideas and resources—or forge new professional networks—and set out to discover whether this resulted in new discourse and practices that address urban demographics and other social and environmental change. In fact, changes in discourse around urban environmental education, justice, and diversity may be the most important indicator of EECapacity’s impact. As social innovation scholar Geoff Mulgan (2012) has claimed, “without exception, social innovations with the greatest impact achieve their effects by changing how people think and how they see the world...”
<table>
<thead>
<tr>
<th>Seven Tenets of Social Innovation</th>
</tr>
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<tbody>
<tr>
<td>1. Social innovations emerge when a practice or a field like environmental education faces contradictions, tensions, or dissatisfactions caused by new knowledge, demands, or needs.</td>
</tr>
<tr>
<td>2. Innovations emerge through novel combinations of existing practices and through trial and error.</td>
</tr>
<tr>
<td>3. Social innovations depend on exchange among a wide array of different individuals, organizations, and networks, each with different ways of working, motivations, and capacities.</td>
</tr>
<tr>
<td>4. Social innovations gain traction when they attract money, recognition, and other resources.</td>
</tr>
<tr>
<td>5. Social innovations result in “compelling new social relationships between previously separate individuals and groups which matter greatly to the people involved, contribute to the diffusion and embedding of the innovation, and fuel a cumulative dynamic whereby each innovation opens up the possibility of further innovations” (Mulgan et al. 2007).</td>
</tr>
<tr>
<td>6. Social innovations achieve impact through becoming formalized as pilots or programs, which often leaves their creators feeling redundant or alienated.</td>
</tr>
<tr>
<td>7. The fundamental goals of social innovation are: creation of social value, promotion of well-being, and cultivation of capabilities.</td>
</tr>
</tbody>
</table>

(adapted from Mulgan et al. 2007, Mulgan 2012)
Part 2. Social Innovations in EECapacity

What did we learn about the creation of social innovations in EECapacity? In this and the next two sections, we present examples of process, practice, and product innovations that emerged out of our professional development activities. We focus here on projects that not only created new products or practices but also resulted in new or strengthened existing networks, thus building capacity for future innovations. In these cases, the innovations emerged out of conscious efforts to create trading zones among environmental education and other professionals for the exchange of resources and ideas. Following our descriptions of innovations that reflect our trading zone guiding principle, we describe several other EECapacity innovations that while not emerging out of trading zone efforts per se, resulted from a concerted effort to include a wide array of stakeholder input and are already having an important impact on the field.
Process Innovations: Networks and Social Media

EECapacity created new collaborations and trading zones to exchange information and ideas about practices through its state consortia, fellowships, online professional learning communities and online courses, and social media. We present short descriptions, social network maps, and examples of educators exchanging information for these projects below. Often these process innovations led to new products or practices, which we discuss in subsequent sections.
**State Consortia**

EECapacity state consortia are partnerships of environmental education state associations and youth and community development and environmental justice non-profit organizations. They applied for funding from EECapacity to conduct professional development activities that would enable cross-sector exchange of information and resources, and members formed networks and jointly conducted face-to-face workshops and later online professional development. EECapacity’s evaluator NewKnowledge used self-reflective focus groups to explore these teams’ relationship building process. From the beginning, sustained partnerships depended on participants’ adopting culturally responsive approaches, where all members sought to learn more about each other’s work. Teams that acknowledged the emotional and multi-faceted nature of environmental education practice, and that used explicit methods to discuss these practices in a safe, respectful way, were more likely to create lasting and inclusive networks.

One challenge we noted early on was that without a more concrete goal or objective, the consortia started to flounder despite their success in creating a safe environment for discussing diverse practices and perspectives. In response to this challenge, EECapacity asked each consortium to design and complete a collaborative project. Some of these projects themselves created new processes for professional development. One example was Colorado’s “un-panel” workshop, in which a hip hop artist and other community partners, along with more traditional environmental educators, “opened a dialog around the wide variety of places where people can learn about the environment” and worked together to redefine assets available to environmental education in their region (CO State Consortia Report). The Maine consortium engaged younger environmental professionals of color in a two-day environmental justice workshop that attempted to disperse leadership for the event among all participants, thus accommodating participants who felt uncomfortable being labeled a leader (O Griset, pers comm).

Over the five years of EECapacity, NewKnowledge’s evaluations reinforced the value of strategic and respectful networking. Consortia adopting such purposeful strategies were more likely to identify with a larger environmental education goal to which they could each contribute (Gupta et al. In review). One state consortium leader described the idea of a larger goal even while struggling to actually name it.

*We are trying to host something that brings together people that care about the environment, the community and young leaders. I think we really de-emphasized... of this being environmental education trying to grow. It was about something bigger than that. To me that’s an important concept; it’s not environmental education trying to grow. It’s trying to create a new bigger thing. I don’t know what to call it.... Creating a new table, a new tent, and not trying to create a bigger group of us [environmental educators].*
Cornell PhD Yue Li conducted research to determine changes in social networks in several EECapacity groups, including the Pennsylvania State Consortium. She found increased exchange of ideas and resources among state consortium members, some of whom knew each other before the workshops while others, such as a leader of a statewide after-school program, were new to working with the state environmental education association (Figure 1).

Figure 1. Pennsylvania State Consortium social network before and after the professional development activities. “Non-respondents” are individuals who were named by survey respondents but did not fill out the survey themselves (Li 2016).

PA State Consortium participants also felt that interacting with other participants had a strong influence on changes in their environmental education practices (Figure 2).

Figure 2. Degree to which members report factors that influenced their practice change in the Pennsylvania State Consortium. Likert scale questions with 1: Strongly disagree; 2: Disagree; 3: Neither disagree nor agree; 4: Agree; 5: Strongly agree (Li 2016).
In short, overall the state consortia established norms of respectful sharing of practices and ideas across diverse groups of professionals. We also documented how one state consortium led to stronger social networks for sharing resources and ideas, which in turn influenced their environmental education and youth and community development practices. The networks enabling communication across perspectives can be considered a process innovation, which also created capacity for future change.
Community Climate Change Fellowship
The goal of the Community Climate Change Fellowship was to foster leadership, networking, innovation, and strategies for engaging new and under-represented audiences in local climate change education. Twenty-six fellows, including environmental educators and community leaders, engaged in a series of in-person and online activities over the course of several years, and developed a strong social network (Figure 3).

Surveys and interviews revealed details about the emerging community of fellows, which, given that all fellows focused on climate change education practice, new NewKnowledge referred to as a “community of practice.” Fellows not only expanded their knowledge of climate change education strategies, but were exposed to an array of ideas and perspectives that they felt enriched their work. The fellows also spoke about the strong sense of community that developed, which provided a source of support as they engaged in challenging work in their own communities.

Similar to the Pennsylvania State Consortium members, fellowship participants felt that interacting with other participants had a strong influence on changes in their environmental education practices (Figure 4).
Figure 4. Degree to which members report factors that influenced their practice change in the Community Climate Change Fellowship. Likert scale questions with 1: Strongly disagree; 2: Disagree; 3: Neither disagree nor agree; 4: Agree; 5: Strongly agree (Li 2016).

Finally, the fellows produced an eBook documenting their practices and explaining issues related to climate change education (See “Product Innovations” below).
Online Professional Learning Community

Online professional learning communities engaged environmental education professionals in a series of webinars, online facilitated discussions, and co-authoring an eBook (see “Product Innovations” below). The participants did not meet in person, which may explain why their network was less dense (they exchanged information fewer times) compared to the State Consortium and Community Climate Change Fellows networks (Figure 5).

![Networks of Urban Environmental Education Professional Learning Community before and after the professional development activities.](image)

**Figure 5. Networks of Urban Environmental Education Professional Learning Community before and after the professional development activities.** “Non-respondents” are individuals who were named by survey respondents but did not fill out the survey themselves (Li 2016).
Participants felt that interacting and sharing materials with other participants had a strong influence on changes in their environmental education practices. In addition, writing eBook chapters, which involved ongoing interactions as part of co-authoring a chapter, had a strong influence on changes in education practices (Figure 6).

Figure 6. Degree to which members report factors that influenced their practice change in the Urban Environmental Education Professional Learning Community. Likert scale questions with 1: Strongly disagree; 2: Disagree; 3: Neither disagree nor agree; 4: Agree; 5: Strongly agree (Li 2016).
Social Media

Facebook closed groups provided a means for creating trading zones for environmental education, youth development, social justice, resource management, and related professionals in the U.S. and globally. Below we describe the *Urban EE Collective* Facebook group, a platform for exchanging ideas and resources about environmental education in cities, and the *Global Environmental Education* Facebook group, which was originally part of an online course but grew to have a life of its own after the course ended.
Urban EE Collective Facebook Group

The Urban EE Collective Facebook Group for urban professionals and volunteers provides a forum to share ideas, resources, programs, practices, and innovative community work that address quality of life issues through environmental education. Today, nearly 2500 members participate in online discussions regarding urban environmental education, youth and community development, and social and environmental justice.

Figure 7a and 7b. Example of educators offering support (after 2016 election) and sharing resources on Urban EE Collective Facebook group.
Global Environmental Education Facebook Group

The Global Environmental Education Facebook Group, originally created for course participants from 140 countries in the online course Environmental Education: Transdisciplinary Approaches to Addressing Wicked Problems, continues as a platform to provide support and exchange ideas among its over 2500 members.

Figure 8a. Description of Global Environmental Education Facebook Group.
In short, just as more structured programs such as the state consortia, Community Climate Change Fellowship, and professional learning communities created trading zones for exchange of information, so too did relatively unstructured social media such as Facebook groups. In all these cases, the trading zones can be considered process innovations.
Product Innovations: eBooks

Participants in the Community Climate Change Fellowship and the four online professional learning communities co-authored eBooks focusing on climate change education and action, urban environmental education, measuring environmental education outcomes, and environmental education in Latino/a communities. Environmental education and related professionals working in a diversity of settings and representing diverse perspectives worked together to co-author chapters with significant guidance and editing from the fellowship or learning community facilitator. Because each of these programs also created platforms for exchanging ideas and resources and thus can be considered as process innovations, this aspect of EECapacity demonstrates how networks or process innovations can lead to products useful for the field as a whole.

Advancing Climate Change Environmental Education: Resources and Suggestions

Co-authored by members of the climate change online community, the online resource Advancing Climate Change Environmental Education: Resources and Suggestions includes an assessment of educators’ climate change education needs and a summary of research on how people learn, environmental psychology, and climate change concepts. It also includes suggestions for teaching/learning strategies that apply research findings and theories; how to teach climate change to address the Next Generation, Common Core, Science, and Social Studies Standards; and learner-focused inquires related to climate change for multiple grades and ages.

Urban Environmental Education

Co-authored by 40 participants in an online professional learning community, Urban Environmental Education is a compilation of case studies and perspectives on environmental education in cities. This eBook advances our understanding of goals, settings, audiences, and teaching approaches in urban environmental education and is useful for pre-service and professional educators. It has been used as a textbook in courses at Wageningen (The Netherlands), Hamline, Antioch Graduate School, and other universities.

Measuring Environmental Education Outcomes

Co-authored by members of an online professional learning community, Measuring Environmental Education Outcomes provides brief reviews and suggested ways to measure multiple potential outcomes of environmental education.

EE en Español: An Exploration of Stories, Case Studies and Best Practices from the Field

Co-authored by nearly 50 bilingual Spanish/English members of an online learning community, EE en Español shares lessons learned from multiple approaches to environmental education in Latino/a communities.
Community Climate Change: A Mosaic of Approaches

This eBook provides overviews of how various fields intersect with climate change education and action, details the local programs implemented by Community Climate Change Fellows, and provides the fellows’ reflections on their experiences as part of EECapacity’s Community Climate Change Fellowship.

In sum, two of the more structured process innovations (Climate Change Fellowship and online Professional Learning Communities) led to product innovations in the form of eBooks useful for the field of environmental education as a whole. The eBooks focus on environmental education in cities and communities of color, thus addressing our EECapacity’s goals of environmental education practice reflecting urban demographics. During the EECapacity program, we began to focus on climate change education as concern about climate emerged more strongly among the environmental education community and created product innovations in this area.
Practice Innovations: Change at Multiple Levels

We examined practice change at the level of the individual environmental education program, region or state, and the field of environmental education as a whole.

Individual Practice
At the level of individual educators, we used surveys to assess practice change in the three EECapacity programs where we measured process innovation using social network analysis—the Pennsylvania State Consortium, the Community Climate Change Fellowship, and the online Urban Environmental Education Professional learning Community. Whereas educators in all three programs formed professional networks (see Process Innovations above), the changes in components of their environmental education practice varied 6-12 months after the start of their EECapacity professional development activities. Most likely to change were program goals and to a lesser extent, activities; less change was seen in audiences and settings. Consistent with the formation of social networks, educators were more likely to incorporate ideas and resources into their programs than to change goals, settings, audiences, or activities. Several factors may explain these results: the limited control some educators have over their audiences, settings, and other aspects of their programs; limited time having transpired from start of professional development activities when we conducted the survey; and the likelihood that some educators saw their programs as already fulfilling their intended goals and did not see a need for change. (We recognize that, in fact, not all programs need to change!)
Figure 10. Degree to which participants report changing practice elements in the Pennsylvania State Consortium (Li 2016).

<table>
<thead>
<tr>
<th>Practice Element</th>
<th>Not at all</th>
<th>A little bit</th>
<th>Some</th>
<th>A lot</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revised or added new goals</td>
<td>3.56</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involved different or more types of audiences</td>
<td>2.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expanded programs to new settings</td>
<td>2.23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revised or developed new activities</td>
<td>2.27</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used new resources to inform programs</td>
<td>3.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used ideas learned from other participants</td>
<td>3.30</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Figure 11. Degree to which members report changing practice elements in the Community Climate Change Fellowship (Li 2016).

<table>
<thead>
<tr>
<th>Practice Element</th>
<th>Not at all</th>
<th>A little bit</th>
<th>Some</th>
<th>A lot</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revised or added new goals</td>
<td>3.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involved different or more types of audiences</td>
<td>3.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expanded programs to new settings</td>
<td>2.86</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revised or developed new educational activities</td>
<td>3.24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used new resources to inform the programs</td>
<td>3.88</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used ideas learned from other participants</td>
<td>3.84</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 12. Degree to which members report changing practice elements in the Project-based Online Learning Community (Li 2016).

<table>
<thead>
<tr>
<th>Practice Element</th>
<th>Not at all</th>
<th>A little bit</th>
<th>Some</th>
<th>A lot</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revised or added new goals</td>
<td>3.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involved different or more types of audiences</td>
<td>2.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expanded programs to new settings</td>
<td>2.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revised or developed new educational activities</td>
<td>3.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used new resources to inform the programs</td>
<td>3.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used ideas learned from other participants</td>
<td>3.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used ideas from the e-book</td>
<td>3.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Regional Practice
It is possible EECapacity may have had greater impact on regional professional development practice than on individual environmental education practices. For example, a number of state consortia members conducted regional leadership workshops in collaboration with younger environmental education professionals of color as described by this staff member at Common Ground Charter School.

_I was similarly struck this Spring, when Common Ground and New England Environmental Education Alliance hosted a 1.5-day summit on supporting a new, racially and economically diverse generation of EE leaders, thanks to a state consortium grant. This opportunity shook up relationships at Common Ground: One of our recent high school graduates was a key member of our design team, for instance, and the summit helped some of our young environmental educators of color raise their voices and build community in a new way. It was also incredibly exciting to host a bunch of racially diverse, age-diverse teams from all over New England on our campus, and to see them all struggling with many of the same questions that we are working on as an institution._

( J Tolman, Common Ground staff member)

Field of Environmental Education
We used participants’ emails and an open-ended survey of national environmental education leaders to assess practice innovation for the field of environmental education as a whole. Other evidence for changes in the field related to urban and diversity issues include: at least five universities are using our Urban Environmental Education eBook as a text; members of our Urban EE Collective and Global Environmental Education Facebook groups continue to post resources daily; and increasing numbers of urban and diversity sessions being presented at the North American Association for Environmental Education (NAAEE) annual conference.

_I was really struck at last year’s NAAEE conference that I could follow a strong theme of Urban EE and racial and cultural equity through the whole conference -- from opening sessions for the state consortia, to workshops by Angela Park and the Foundation for Youth Investment. I don’t think I would have been able to have this rich capacity-building experience if EECapacity hadn’t been helping to shift EE conversations for the last several years. ( J Tolman, Common Ground staff member)_
Note that Tolman’s quote captures a second change in the field of environmental that is highly intertwined with the urban emphasis—that is, the emergence of more culturally sensitive practices. As the lead EECapacity program evaluator remarked:

*The publications, climate change fellows, and state consortia all created durable impacts in communities that will last well beyond the life of the project. These risk-taking efforts have helped generate a needed dialogue on race and inclusion that have positively influenced emergence of a new culture. The process has not been gentle and certainly feelings were hurt, but the conflict also revealed systemic challenges to accepting the historical approach to professionalization that may have offered more opportunity to those who appreciate rural nature or build their understanding of the field based on their own self-directed opportunities in nature. (J Fraser, President of New Knowledge Organization)*

Another program evaluator observed:

*Success has entailed being open to being vulnerable about one’s specific EE stance, acknowledging that a power differential exists between those explicitly affiliated with professionalized, established groups and those part of emerging community-oriented groups, often in urban contexts. These two groups are also conflated, to some extent with socio-economic differences, further complicating any prospective collaboration between them. However, we have consistently seen that state efforts that have mindfully acknowledged these glaring differences and attempted to equalize their role in a potential partnership have emerged successful, in the long run. For example, commuting a long distance from one region of the state to another to meet their partners to reduce barriers to engagement is a powerful indicator of the value of a future collaboration. The value added to the EE field is the deeply reflective, culturally responsive, and structured opportunities teams in each state have created as an exemplar of what’s possible by very consciously identifying and respecting shared goals.*

An educator reflected the focus on racial and ethnic diversity through a description of his experience at the North American Association for Environmental Education annual conference:

*For me the most important change is not so much the many different projects, but simply the fact the EECapacity has changed the conversation. Everyone now talks about how to expand and diversify EE without having to talk about why. (Adrian Ayson, Executive Director, New England Environmental Education Alliance)*
Additional EECapacity Innovations
EECapacity created three other important products that are already making an impact on the field. The first of these is the *Urban Environmental Education Review* textbook being published by Cornell University Press. The process for creating this book included sharing ideas and perspectives among individual chapter co-authors, although relatively few opportunities presented themselves for sharing among the group of 90 authors as a whole. The other two products, the *Environmental Education Guidelines for Community Engagement* and the eePRO website, were created through an iterative process of stakeholder participation that involved commenting on a series of pilot versions, each one incorporating the stakeholders’ most recent suggestions.

*Urban Environmental Education Review*
EECapacity assembled 90 authors from 18 countries to produce a college textbook called *Urban Environmental Education Review*. The book will be published in May 2017 by Cornell University Press, which gave us permission to make a third of the content (10 chapters) freely accessible online as *Essays in Urban Environmental Education*. The editors define urban environmental education as any practices that create learning opportunities to foster individual and community well-being and environmental quality in cities. Topics in *Urban Environmental Education Review* range from the urban context to theoretical underpinnings, educational settings, participants, and educational approaches. Based on reviews of this textbook, Cornell University Press decided to launch an environmental education series, which will include books based on lessons learned in EECapacity in online learning, social innovation, climate change communication, and individual, community and ecosystem outcomes of environmental education.

*Environmental Education Guidelines for Community Engagement*
The new guidelines are part of a continuing series that seek to guide environmental educators in applying rigorous standards to their practice. Each publication synthesizes the perspectives of hundreds of individuals and organizations who review working outlines and drafts. Through a series of recommendations, stories from the field, and a toolkit of resources, the *Environmental Education Guidelines for Community Engagement* seeks to foster “the excellence in community engagement that will enable us to achieve our environmental education mission more effectively and contribute to building more sustainable and resilient communities.”

eePRO
eePRO is a comprehensive website for environmental education professional development and resources. It provides announcements of professional development and job opportunities and houses resources for environmental education. Anyone can join its online facilitated interest groups focusing on topics such as international environmental education, research and evaluation, higher education, climate change education, environmental education in urban settings, and sustainable communities, among others.
Conclusion: Social Innovations and Trading Zones in Urban Environmental Education

EECapacity used a trading zone strategy to foster innovations in urban environmental education. Our approach to change the field of environmental education is consistent with current scholarship emphasizing the need for crossing academic disciplines (e.g., psychology, resource management, political science) and crossing the non-profit, business, and government sectors to address “wicked problems” related to environmental quality, equity, and behavior change (Hirsh Hadorn et al. 2008, Brown et al. 2010). It also reflects current scholarship on social learning, citizen participation and co-creation of knowledge, and communities of practice. As recounted by Jose Marcos-Iga, an educator and EECapacity Leadership Team member, following such an approach was challenging but also yielded a richness of experience and products.

One of my favorite examples is the EE en Español PLC. This was a collaboration with the Cornell Lab of Ornithology. We engaged close to 50 bilingual environmental educators who work with the Latino community, to explore the challenges, opportunities and innovative practices that involve EE with the Hispanic communities in the U.S. and beyond. The effort produced a bilingual eBook where teams of authors share the lessons learned from various approaches to EE in the Latino community. While the production of this eBook is a great outcome for the field of EE, the most valuable outcome is the creation of a small network of educators, both Anglo and Latino, who continue to learn from each other way after the end of the process. Some of the challenges involved the normal level of complexity in communicating and writing an eBook in two languages, but more so the wide diversity of practices and level and styles of writing that were represented in the group, that brought richness but also difficulties in editing a book that feels cohesive.

EECapacity created professional networks in which educators exchanged information and learned from each other. This led to some practice changes in educators’ individual practices as well as to innovative products produced by groups of educators working collaboratively. State-level professional development efforts and the field of environmental education as a whole incorporated innovative approaches to professional development centered on diversity and urban environmental education.
Recommendations

As EECapacity draws to a close, we offer several recommendations to leaders of environmental education professional development.

1. **Take advantage of resources developed and lessons learned through EECapacity.** The social innovation model led to significant successes in forging new partnerships or processes of environmental education professional development, creating products already being used widely in the field, and changing practice at the regional and national level to incorporate more urban and culturally-responsive approaches. Future facilitators of professional development can review these partnerships, products, and practices and decide which ones are worth using, promoting, and adapting to new settings.

2. **Consider multiple means to foster co-creation of knowledge including using existing social media.** eePRO is a stellar website developed through EECapacity, which serves as an invaluable resource for environmental educators globally. Through its interest groups, it is already fostering dialogue among educators around the world. Consideration also should be given to additional approaches to peer-peer sharing and co-creation of knowledge, such as the use of familiar social media sites. EECapacity’s experience can contribute to discussions of how diverse experts and practitioners co-create resources and practices through social media (e.g., Facebook), online learning, and face-to-face fellowships.

3. **Include a collaborative project and young professional partners in state capacity building efforts.** After the EECapacity added a requirement that state consortia professional development efforts be directed toward a defined goal and project teams needed to include young professionals, the statewide groups became more dynamic and innovative and their members became more passionate about their work.

4. **Consider what are the most important target audiences depending on societal needs and professional development goals.** EECapacity focused on urban audiences to address the need to strengthen urban environmental education practice. Given changing demographics in suburbs and the need to address underserved rural communities, future projects might focus on a broader range of target audiences.

5. **Balancing approaches in a professional development program should be addressing.** A fundamental issue is balancing the ongoing need for professionalization of the field of environmental education in response to disparaging labels like “tree-huggers” (Sanera and Shaw 1996) with the need for addressing concerns like equity and climate change.
Whereas the former would suggest an emphasis on professionalization, accreditation and guidelines, the latter require networking and transdisciplinary approaches, consistent with the literature on innovation and wicked problems. A related issue is that an emphasis on professionalization and leadership may feel exclusionary to younger professionals whose focus is on integrating social justice with environmental education. For example, in their work with youth of color, the Maine State Consortium found that terms like leadership can be off-putting in some cultures and to some individuals. In short, how much will professional development approaches reflect global movements to approach environmental problems as inextricably linked with social problems, the communication styles of younger generations, and issues of social and professional identity among a broad group of professionals and volunteers facilitating environmental learning?

6. **Include researchers on the project team.** Including graduate students as researchers and working with an evaluation firm that engaged in serious scholarship around our professional development program enabled us to reflect on our EECapacity process, practice, and products. This led to several research publications (Fraser et al. 2014, Li 2016, Gupta et al. In review) and perhaps enabled us to make more signification contributions—and innovations—in the field of environmental education.
References Cited


Li, Y. 2016. Professional Networks and Practice Change In Environmental Education. Cornell University, Ithaca, NY.


Suggested reference and credits

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Yue Li’s work focuses on professional development for environmental educators using online and face-to-face activities. Through her research and outreach, she seeks to understand how networking among environmental educators fosters innovation in their environmental education practice.

Lori Mann is the Program and Conference Manager of the North American Association for Environmental Education. Her work focuses on professional development, capacity building, and networking.

Gus Medina managed EE Capacity from 2011-2014 and the Environmental Education and Training Partnership (EETAP) from 1995 to 2010. Previously, Dr. Medina served as a Senior Program Officer with World Wildlife Fund-US.

For over twenty years, Pepe Marcos-Iga has helped professionals in the nonprofit sector build their capacity, grow their cultural competencies, and become more impactful at their work. He is a trainer, educator, storyteller, and problem solver and was a member of the EE Capacity Leadership Team.

Akiima Price uses nature as a medium to create social change in urban communities of color. She has worked with numerous environmental organizations to create and implement innovative programs that build bridges into low-income communities, and led the community environmental education workshops and urban environmental education social media for EE Capacity.

Bora Simmons is the founding director of the National Project for Excellence in Environmental Education. She served on the North American Association for Environmental Education Board of Directors and as its president and on the National Project Learning Tree Education Operating Committee and Environmental Education and Conservation Global.

Anne Umali Ferguson is the Project Manager of EE Capacity, EPA’s National Environmental Education and Training Program. Her work focuses on leadership development, capacity building, and partnership building at the individual, community, and institutional level.