

Ingredients for an equitable partnership are examined, and while trust is key, building positive, long-term relationships is not a straightforward process.

The Crabby Creek Initiative: Building and Sustaining An Interdisciplinary Community Partnership

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Abstract

In this article, we identify the steps and strategies that emerged through an interdisciplinary, community-based participatory research (CBPR) project—the Crabby Creek Initiative. The Initiative was undertaken jointly by Cabrini College faculty in biology and psychology, the Valley Creek Restoration Partnership (VCRP), the Stroud Water Research Center, (SWRC) and local residents of this eastern Pennsylvania region. The paper examines the phases the partners have gone through and the strategies used as the building blocks of partnerships in the process of collaboration: trust, mutual design, shared implementation, joint ownership, and dissemination of knowledge, the building blocks of sustainable partnerships. Ultimately, the lessons learned have the potential to galvanize practitioners to engage not only in citizen science, but also more broadly in the practice of applied and engaged democracy.

Introduction

What do vanishing brook trout (Pennsylvania's state fish) and the possible flooding of George Washington's headquarters in Valley Forge National Park have to do with Cabrini College students learning about stream chemistry and macroinvertebrates, or with local Pennsylvania residents learning to conduct their own stream water monitoring? These experiences stand at the heart of the Crabby Creek Initiative, an interdisciplinary CBPR project. Undertaken jointly by Cabrini College faculty in biology and psychology, the Valley Creek Restoration Partnership (VCRP), the SWRC, and local residents of this small region of southeastern Pennsylvania—the Initiative serves as more than a template of an effective local watershed management program; it also demonstrates the creation and maintenance of mutual, sustainable partnerships—the very roots of applied and engaged democracy that inform citizen science.

In terms of cultivating the potential for applied democracy and, ideally, systemic social change—the underpinnings of social justice—the

Crabby Creek Initiative offers a compelling story. The steps involved in creating sustainable partnerships are still rarely studied or widely shared with nascent practitioners (Adams, Miller-Korth, & Brown, 2004). This gap remains despite that building strong partnerships depends on a mutual understanding of growth through a series of progressive stages that not only enhances the success of such undertakings, but also hones the skills needed to ensure collaborative, mutual democratic interactions—in short, to sustain such partnerships that strive to include multiple voices at every stage with the aim to move toward public education, behavioral change, advocacy, and, eventually, policy change. To address such a gap, this work uses case study to magnify the processes through which complex partnerships unfold and develop. In so doing, we illuminate several core principles that characterize interdisciplinary partnerships. The foundational steps we outline add to existing scholarship in CBPR in and across such disciplines as biology, psychology, and ecology (Amuwo & Jenkins, 2001). By reflecting on our processes of engagement, we strive to achieve our long-term goals: increasing community access to scientific knowledge while sharing technical expertise and empowering people to engage civically—thereby enhancing environmental stewardship, giving community members both the confidence to take charge of watershed studies themselves and to understand the relationship between people’s choices, the effects those choices have on our environment, and, more specifically, the ability to analyze their own scientific results critically. We underscore the importance of trust, mutual design and implementation, and creativity for effective, long-term community partnerships.

Other conceptual frameworks for creating and maintaining such productive relationships hail from a variety of fields. Health practitioners, for example, have amassed an impressive range of orienting documents through the Community-Campus Partnerships for Health, on such topics including community-institutional partnerships and understanding trust among partners (see <http://www.ccpb.info/>). Here, practitioners grounded both in community development and community organizing provide specific nuts-and-bolt worksheets titled “Developing and Sustaining Community-based Participatory

Research” and “Partnerships: A Skill-building Curriculum,” as one comprehensive toolkit. These studies provide an experiential backdrop as well as theoretical framework that echoes and underscores the pragmatic emphases in our Crabby Creek Initiative.

Participants

The project involved the combined efforts of Cabrini College faculty and students, the SWRC, the VCRP, key local stakeholders from the community including the Valley Forge Chapter of Trout Unlimited, the Green Valleys Association, Open Lands Conservancy, West Chester Fish, Game and Wildlife Association, and the the League of Women Voters of Tredyfrin Township in West Chester County.

Procedures

Building positive, long-term, mutually committed relationships is a hallmark for highly effective CBPR projects; moreover, collaborative, community-based research is a process: one best done in “baby steps”—while keeping an eye toward the full participation of community partners (Stoecker & Schmidt, 2008). Such insights held true for the Crabby Creek Initiative, as community members and academic partners proceeded in precisely this sort of iterative, adaptive process, a process best characterized by three steps or phases.

The initial phase of the collaboration began when Cabrini College received a grant from the Environmental Protection Agency (EPA). This grant was for water-quality monitoring in Crabby Creek. To implement the project, Cabrini faculty identified the local watershed association, the VCRP to ask for guidance on what could be done.

The collaboration that resulted from this initial contact quickly evolved to include people who brought diverse expertise to the table. The middle phase established preliminary operating structures, thus connecting organizations with shared interests. Conversations among the partners—Cabrini College faculty, the VCRP, and the SWRC—began a longer-term relationship that would eventually tackle an array of inter-related environmental issues and methods for addressing them. The third—and currently emerging—phase demonstrates how the Crabby Creek Initiative is

moving toward greater sustainability among and across all partners. Initially, Cabrini faculty began collaborating with the VCRP. Later the SWRC joined the effort to assist with water quality monitoring efforts. Based on the results from our initial collaboration, we now have a firm base on which to build. We are now moving more toward citizen science by raising community awareness at the grassroots level through educational initiatives. Our goal is to bring about behavioral change in both students and community members that will result in better water quality in the Crabby Creek watershed.

To be more specific, the Crabby Creek Initiative began with one faculty member stumbling onto a local issue through the back door. In 2005, having inherited an EPA grant from a fellow Cabrini College faculty member, Dr. David Dunbar, an avid fisherman, was in search of a local environmental issue that would fit the grant's parameters. Through his Trout Unlimited contacts, he was put in touch with Dr. Owen Owens, chair of VCRP, a local coalition bound together by its commitment to the restoration of Valley Creek, and the dialogue began.

The VCRP formed in 2001 to address industrial PCB contamination in the Valley Creek watershed. The Valley Creek watershed is a 23.4 square mile system of streams and tributaries within the Philadelphia Metropolitan area, including Cabrini College, located in Radnor Township. The stream flows through Valley Forge National Historic Park and provides an important habitat for many species of fish, birds, mammals, and amphibians. The watershed is also designated as a Class A wild trout stream by the Pennsylvania Boat and Fish Commission. The Commonwealth of Pennsylvania awarded its highest protection level of Exceptional Value to the watershed. Nonetheless, it has undergone dramatic change from rapid suburban development. Specifically, the increase of impervious surface and inadequate stormwater management have resulted in bank erosion, flooding, and siltation, all of which have a negative impact on the physical habitat and biological community of the creek. In fact, as a direct result of stormwater runoff issues arising from Valley Creek tributaries, several historic buildings in Valley Forge National Historical Park, including Washington's and Lafayette's

headquarters, are in danger of being flooded within a decade (National Park Service, 2005).

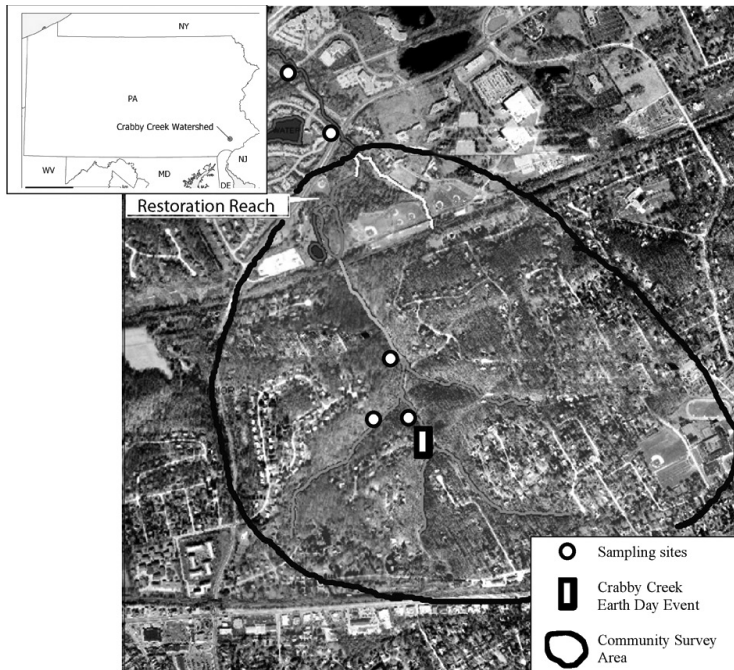
The VCRP has been working for a number of years to maintain, improve, and enhance the Valley Creek watershed. Furthermore, Crabby Creek, a smaller, yet critical tributary of Valley Creek, has sustained ongoing stormwater runoff problems because of poorly designed and implemented housing built over the last two decades. Additionally, erosion has exposed a wastewater sewer pipe that crosses Crabby Creek. It is now in danger of cracking and releasing raw sewage into the creek. To address the above issues, VCRP applied for and was awarded funding to restore Crabby Creek. The intent of restoration was twofold: to increase the creek's capacity to deal with the added runoff and to rechannel the creek to bypass the sewer line. Ultimately, the VCRP hoped the restoration work would increase the health of the creek as well. Dunbar's conversations with VCRP began at this point. After attending an academic conference on interdisciplinary, undergraduate, community based research, Dunbar was looking for a way to use the EPA grant to promote collaboration with community partners and enlisted the assistance of Terlecki.

Results

Crabby Creek Macroinvertebrate Studies

Once the VCRP had completed their restoration activities, they needed to monitor the effectiveness of their efforts. They approached Cabrini College for assistance in developing a five-year restoration monitoring plan. The restoration monitoring proved a catalyst to unite the partners while accomplishing different goals. For Cabrini, the monitoring provided the opportunity to engage biology students directly in environmental research. Dunbar and several undergraduate students arranged summer internships with SWRC whereby Cabrini students learned macroinvertebrate monitoring techniques. Cabrini students earned undergraduate research credit for their work. Macroinvertebrates are a proven indicator species in determining stream health and are an integral component to long-term stream monitoring (Cairns & Pratt, 1993; Hellawell, 1986; Jackson & Fureder, 2006; Rosenberg &

Figure 1. Earth Day event, sampling sites, survey area (circle)



Resh, 1993). Equipped with new knowledge and skills, these student partners conducted two years of pre-restoration studies of the aquatic macroinvertebrate community (Figure 1). Community interest in the stream monitoring grew when Dunbar and his research students presented their macroinvertebrate monitoring results and analysis at the VCRP and Trout Unlimited meetings during the summers of 2008 and 2009. As a result of these presentations, the VCRP has become interested in expanding the study to target the sources of stream impairment through additional stream chemistry monitoring.

Ultimately, the process of active collaboration between SWRC and Cabrini College students allowed the monitoring work to be completed at lower cost, while providing a valuable learning opportunity for the Cabrini students. It also provided VCRP with the important baseline data necessary to assess the degree of stream impairment and the effectiveness of their planned restoration. One successful outcome of this first phase of interdisciplinary, collaborative research is that the students' data, despite being preliminary, prompted the partnership members, especially the VCRP, to seek the sources of the degradation and the effectiveness of state and federal oversight. The results also served to clarify the partnership goals of educating the

local community about how to monitor Crabby Creek.

Since the students' presentations of their data to VCRP and the community, some dedicated citizens have taken it upon themselves to do stream chemistry monitoring themselves—a clear example of citizen scientists at work. These citizens are “adding their input,” creating “new knowledge,” and thus “taking an active role in environmental conservation or restoration” (Rosales, Montan, & Flavin, 2008). To capitalize on the community enthusiasm of the stream chemistry monitoring workshops conducted by Cabrini and SWRC, a volunteer water quality monitoring training was held following our second Earth Day event. One example

of active citizen scientists thus revolves around residents like Sean Moir and Sarah Kligahm. Moir, Kligahm, and other residents created a Crabby Creek Measurement website (<http://www.savevalleycreek.org/restorationplan.asp>) that features blog postings of monitoring updates conducted by residents on pH, conductivity, dissolved oxygen, temperature, and nitrates. From this website the public can track the group's monthly monitoring results. Because of the activities described above, community members know that they can rely on both Cabrini College faculty and SWRC staff for guidance in their stream monitoring volunteerism.

Additionally, at the request of community members sponsored by the Pennsylvania Department of Environmental Protection (PADEP), Cabrini College faculty and SWRC staff are coordinating a bacteria monitoring program on Crabby Creek. Community residents often smell a strong sewer odor coming from the township sewer line that runs along the creek. This has led to community concern that sewer leaks or overflows could lead to *E. coli* contamination of the creek. Therefore, when PADEP announced a program during the summer of 2009 to help community volunteers assess bacterial contamination in a limited number of

streams in Pennsylvania, SWRC, and Cabrini College immediately contacted community volunteers. Trout Unlimited members had long expressed concerns about potential bacterial contamination of the creek and volunteered at once to collect stream samples using PADEP protocols and transport them to a certified environmental laboratory that processed the samples over a 60-day period. The study did find elevated bacterial levels in the stream. Volunteers hope to repeat the study. Analysis for *E. coli* typically requires a laboratory with incubators to culture the samples—equipment not readily available to volunteers. To assist the community in continuing the study, Cabrini students and faculty are evaluating inexpensive, qualitative test kits, such as the ColiQuant MF method, that would enable community volunteers to repeat the study as well as to provide a way for Cabrini students who are not science majors to engage in bacterial stream monitoring.

Crabby Creek Community Environmental Attitude Survey

At the same time Dunbar and his students were working on the scientific research, the VCRP, in consultation with Terlecki, undertook research to explore the wider psychological dimensions that may be influencing the Crabby Creek environment and the actions of those who live in or around it. Terlecki's approach was to design an environmental attitude survey exploring educational, attitudinal, and behavioral aspects of environmental conservation. The survey aimed to discover how much the local Crabby Creek community knows about the current degradation and planned restoration of Crabby Creek, as well as to gain insight into whether community members would like to volunteer their time in conducting studies on Crabby Creek and assisting VCRP in preventing problems related to stormwater runoff. Understanding where and how community members obtain information about their local and global environments, as well as what conservation behaviors they practice, was also of interest. These are elemental components for helping communities build sustainable initiatives and healthy ecologies (Bott, Cantrill, & Myers, 2003; Schultz & Zelezny, 2003). As advocated in CBPR principles and protocol for equitable

partnerships, it was critical for both Cabrini College faculty and members of the VCRP to work collaboratively in preparing questions for the survey. VCRP members suggested that having students hand-deliver surveys would facilitate a greater connection among community members and students (Monroe, 2003). During the spring 2006 semester, and again in the fall 2009 semester, over 30 Cabrini College psychology and biology undergraduates, along with Terlecki and Dunbar, hand-delivered the community assessment surveys to over 400 homes (with another 200+ mailed, for a total of approximately 600 surveys distributed) (see Figure 1). Over 250 surveys were returned to Terlecki (approximately a 46% response rate).

Terlecki and undergraduate psychology majors analyzed survey results and made the following conclusions: They found that 25% of residents visit Crabby Creek seasonally and over half (55%) of residents were "somewhat" concerned about local environmental issues and "very" concerned about global environmental issues. It was also found that most residents engaged in some form of environmental conservation practice (94% recycle, 87% conserve electricity, 67% clean air filters, 65% reuse paper products, 55% use energy-efficient light bulbs, 47% reduce trash, 28% use public transportation). Interestingly, only 20% of residents had ever received information regarding local environmental issues from the Pennsylvania State Government or local businesses/industry. Unfortunately, 27% of respondents have had their property damaged by water/flooding, yet 61% of residents who returned surveys were unaware of current stormwater runoff problems in general, and an overwhelming 74% of residents were unaware that Crabby Creek has sustained environmental degradation. What was most promising, however, was that 41% of respondents stated they were interested in getting involved in the Crabby Creek Restoration Project. These individuals have been contacted post-survey to encourage their future involvement in volunteer projects sponsored by the VCRP in the Crabby Creek restoration project.

Environmental Psychology Course

The involvement of volunteer students in the project spurred the idea to create a course

that could address the Crabby Creek Initiative. An honors level Environmental Psychology course was developed and co-taught by Terlecki and Dunbar. The course focused on watershed issues in Crabby Creek, but also more global environmental issues faced all over the world. Students were of varying levels (freshmen through seniors) and academic majors. The course involved community speakers and off-campus trips to the Crabby Creek site. Students, as part of their final project, created trifold brochures (covering a wide variety of water-related environmental topics) to be distributed and displayed around the Crabby Creek community. Also as part of the course, students helped organize an environmental celebration for community members to attend—the Crabby Creek Earth Day.

Crabby Creek Earth Day

As we developed the environmental psychology course, the VCRP expressed interest in organizing an inaugural Crabby Creek Earth Day built around our course, an event involving both community members and students in celebrating the local environment. This idea was a direct outcome of the Crabby Creek Environmental Attitude Survey, which had indicated that many Crabby Creek residents would be interested in participating in such activities. Through its integration with the course, the inaugural Earth Day also would represent a cumulative experience for students. Dunbar and Owens, the VCRP chair, agreed to co-chair the inaugural Crabby Creek Earth Day Committee—a prime example of how our initial forays into interdisciplinary and cross-sector collaboration had borne fruit. The committee itself embraced key personnel, including Terlecki, students from environmental psychology, the VCRP, SWRC, the Tredyffrin League of Women Voters, and Trout Unlimited. Together, we convened several Crabby Creek Earth Day committee meetings at Cabrini to discuss and plan the events and activities that would be sponsored at this inaugural event. A recent addition to the Crabby Creek Initiative and the Earth Day committee is a new faculty member at Cabrini College, Dr. Caroline Nielsen, assistant professor of biology. Nielsen is engaging her students in research on Crabby Creek as well as other local watersheds

The collaborating partners wanted environmental psychology students to work hand-in-hand with community members and learn about the local issues these residents face. Workshops at the Crabby Creek Earth Day included a station on water-quality monitoring using macroinvertebrates; a station on aquatic turtles geared toward children; a station on key stream chemistry parameters; a station on rain barrels and rain gardens (to give guidance to community members with interest in implementing any of these stormwater management practices); and several booths and tables providing informational handouts and displays. Interested groups also had the opportunity to participate in an in-stream bank stabilization project guided by the Trout Unlimited chapter. This community action offers a further example of the ripple-effect of strong partnerships. Such stream bank stabilization work was needed as part of an initiative by Trout Unlimited to bring back native brook trout to the upper section of Crabby Creek (Potential Restoration Site area 2, in Figure 1). Lastly, the day included a tour of the section of the creek scheduled to undergo restoration work, a step which showcased the VCRP's next major initiative with Crabby Creek. Our first Crabby Creek Earth Day, held Saturday, April 19, 2008, was centered at Crabby Creek Park. Over 70 Crabby Creek community members, as well as a local Girl Scout troop, took part in this inaugural event (see Figure 2).

After the success of Earth Day, several questions arose; namely how can Cabrini College, the VCRP, SWRC, and the Crabby Creek residents sustain their important work around this watershed? The VCRP is enthusiastic in its desire to have Cabrini faculty and students continue working with this coalition of organizations alongside the Crabby Creek community: teaching and learning together about best practices for stormwater runoff management. A significant concern is that even if the restoration succeeds, if additional housing development occurs in the upper stretches of Crabby Creek, and/or people don't practice sound backyard ecology, then the same stormwater issues the restoration fixes will return.

To sustain the impact of our Crabby Creek Earth Day, the committee decided to make

it an annual event. Dunbar and Nielsen agreed to co-chair the second Earth Day. As surfaced in the committee meetings, the VCRP thought it highly desirable not only to alert community members to ongoing efforts with the stream, but also to also educate Crabby Creek community members in best stormwater management practices. During the 2009 Crabby Creek Earth Day, residents of the watershed thus had the opportunity to sign up to participate in a backyard ecology program to reduce stormwater flows into Crabby Creek. This program represents a partnership of VCRP, Cabrini College, and Tredyffrin Township.

Throughout the program, homeowners were offered free, one-hour property consultations with an arborist and a landscaper. These professionals suggested how the homeowners could use plantings, rain barrels, rain gardens, grasses, and invasive plant removal to beautify their property while reducing stormwater discharges into the environment. Nine families signed up for the free consultations and agreed to implement at least some of the experts' stormwater management suggestions. As this program grows, it should have a substantial impact on stormwater runoff from residential areas throughout the Crabby Creek watershed. Tours of the creek's newly restored stretch, as well as water quality and stream life stations, were also popular activities at the event. As an added feature, a representative of Valley Forge National Historic Park provided information about the park and how the efforts of the VCRP, Cabrini College, and the SWRC on Crabby Creek can improve Valley Creek, which flows directly through Valley Forge Park.

The Crabby Creek Initiative's goals in these Earth Day events could be viewed as promoting a more participatory, democratic kind of knowledge building, the kind of learning context in which "citizens and expert professionals treat each other as equals in initiating and generating knowledge," as Rosales, Montan, and Flavinc

Figure 2. Earth Day at Crabby Creek



More than 70 community members and a local Girl Scout troop came together at Crabby Creek Park for Crabby Creek Earth Day, April 19, 2008.

(2008) explain, helping people understand that "scientific knowledge and training are a means to an end, not an end in itself" (p.4). Indeed, the entire Crabby Creek Initiative has grown noticeably through the collaborative relationships described above.

One recent student-driven action to emerge from our second Earth Day event is a YouTube video documentary created by Delta Benoit, a student of Dr. Janice Xu. (<http://www.savevid.com/video/crabby-creek-earth-day.html>) Xu, a communications professor at Cabrini College, joined the Crabby Creek Earth Day committee this year, and she recruited several of her students to participate in Crabby Creek Earth Day. The video documentary speaks to the potential for the Crabby Creek Initiative to develop even further across disciplines and fields.

Backyard Ecology Program

To sustain community interest in stormwater management, members of the Initiative have taken further steps. The backyard ecology workshops, for example, have evolved into plans for an entire Backyard Ecology Program, which will include developing and enhancing the collaboration among everyday citizens, scientists, and environmental professionals. Professionals work with interested homeowners, literally walking alongside them on their

property to assess the environment and provide the homeowners with a list of suggested actions for improved stormwater management. The homeowner is asked to commit to implementing up to three of the action options recommended by the landscape designer or arborist over the next year. The owner also receives a free rain barrel for signing up for the program and lists of plants that are free through TreeVitalize, a partnership program to restore tree cover in Pennsylvania. Additional trees and shrubs can be purchased by the homeowner. For owners who choose to install a rain garden, there are funds available to support the design and installation of the rain garden. Lists of rain garden designers are similarly provided, or the owner can receive do-it-yourself rain garden design instructions. The VCRP has received funding for this program and trees and shrubs from the TreeVitalize organization (www.treevitalize.net). The goal in 2009 was to complete 30 homeowner consultations, with additional homeowner outreach conducted by the VCRP, the SWRC, Tredyffrin Township, and Cabrini College.

The VCRP members have now conducted 12 consultations for the backyard program and have given a list of recommended actions to each property owner. The VCRP have also prioritized five sites for further gratis work for the owner. In all five cases, one or more rain gardens will be designed. In two cases, swales and other stormwater control features will be designed. One property is being modeled in a very precise manner, including calculations of runoff from the roofs, driveways, and sidewalks. The runoff entering the property from offsite will also be calculated. The rain gardens and driveway trough will be designed to control a rain of one inch. What is learned from this approach could be adapted by other watershed organizations. Data are not available yet on whether this goal has been met.

As we look to the future, Cabrini College, the SWRC, and the VCRP are planning to hold annual Crabby Creek Earth Day events. Doing so would help sustain several worthy initiatives already in place such as the Backyard Ecology program discussed above. We have also been successful in establishing a citizen's stream monitoring program through our inaugural Crabby Creek Earth Day event. In

order to sustain this endeavor, we are working to recruit a Crabby Creek community member to co-chair an upcoming Crabby Creek Earth Day event. The hope is that this co-chair will assume planning duties for next year's Earth Day event, so that the event will become self-sustaining through community involvement in all phases and dimensions of the collaborative process. Although we expect that the event will be community-run in the future, we plan to continue to have Cabrini College involvement. Starting this year, we will be advertising Crabby Creek Earth Day as part of Cabrini's Earth Week festivities, bringing it to the attention of the entire campus community. In addition, we hope to have students from our new EARTH Living and Learning Community, along with students from the Watershed Citizenship Learning Community, participate in the event.

Discussion

The importance of working together as equal partners in interdisciplinary research may seem patently obvious: Would not all parties involved wish to develop new knowledge, capabilities, and opportunities for ongoing, shared learning? However, implementing meaningful community-based collaboration is not as straightforward as it may seem, especially when those involved are cross-sector and interdisciplinary partners new to campus-community partnerships. Two recent studies further knowledge of the iterative, relational aspects of community partnerships essential to understand, particularly during the first year or developmental phase. Power, Cumbie, and Weinert (2006) offer an apt touchstone for our work, for the evolutionary process that their article describes closely parallels the gradually unfolding and recursive process that has characterized the Crabby Creek Initiative. As in their example, the Crabby Creek partners did not know at the outset the extent to which the Initiative would become an inter-organizational, collaborative arrangement. Articles such as "Staying at the Table: Building Sustainable Community-Research Partnerships" (Rappaport, Alegria, Mulvaney-Day, & Boyle, 2008), discuss symbiotic, interdependent roles, similar to those that evolved among the Crabby Creek partners. Central among the important ingredients for equitable partnerships, the

partners say, is practicing cultural humility: an attitude and approach they recommend professional researchers adopt when entering communities. This stance requires that we demonstrate openness to others' worldviews and local wisdom; be willing to share mistakes and growth; maintain empathic interactions among collaborators; be honest about motives; and be willing to address conflict and potentially uncomfortable moments of disagreement—all with the eye toward developing trust and, ultimately, keeping people “at the table” (p. 694-695).

Other well-known challenges to building sustainable partnerships are keeping open lines of communication and maintaining coherence between members of a partnership. The Crabby Creek Initiative has worked diligently to create a strong relationship among Cabrini College, the VCRP, SWRC, and local Crabby Creek residents. As we enter our fourth year, we are continuing to build on the creative, productive structures we have put in place. These include collaboration, participatory action, and citizen science, all of which revolve around and are informed by interdisciplinary civic engagement and democratic, community-determined practices.

The ultimate objective is to restore the tributaries to Valley Creek by using Crabby Creek as a model stream, a very important target, for if the tributaries are not restored, the Valley Creek cannot improve. But to do so, it is important that post-restoration stream assessment be carried out. While there is considerable funding available for stream restoration work, there is much less money to do stream assessment studies to evaluate whether the restoration actually worked. Volunteer partnerships, such as the one described here, are clearly necessary for long-term assessment of water quality and the protection of watershed resources.

In their white paper on citizen science as an organizing principle, Rosales, Montan, & Flavinc (2008) explain that the significance of citizen science emerges in the very way it “taps into traditions and impulses related to working for the public good, to care for the commons, and building the commonwealth—governance for the common good” (p. 3). The authors' explanations offer a clarion call, one that the

Crabby Creek Initiative echoes wholeheartedly: “citizen science fuels intellectual public life, builds the public domain through useful work, and acknowledges that all people have the ability to generate knowledge. Citizen science is often framed as a form of environmental management, but it is also a political model of the role citizens can play in their society. Citizen science can determine the kind of democracy we have” (p.3). Saving a quality stream so close to a large, urban area is especially important, as Owens states, because doing so suggests that other waterways and watersheds can also be saved. From our experience, we believe that following the example of the Crabby Creek Initiative is one way to achieve this goal.

Democracy aims to include all in the participatory practices that improve the quality of life: social, political, economic, and environmental. Our Crabby Creek Initiative continues to develop and evolve at Cabrini College, but we continue to make space for more wide-ranging, collaborative endeavors that take us well beyond the confines of a small, Catholic (liberal arts) campus. The main lessons learned revolve around the importance of developing trust over time; this trust emerges from open and frequent conversations, shared implementation in all phases of a project, mutuality in design, joint ownership of knowledge, and an understanding of what it may take to remain flexible to the needs, views, and voices of multiple constituencies in order to build capacity collaboratively. Like other institutes of higher education we are striving to embed inclusive processes for problem-solving into our classrooms, into our conversations with community-partners, and into our concerted efforts to take our deliberations to the next level of democratic involvement: policy-making at local, regional, national, and, ideally, global levels.

References

- Adams, A., Miller-Korth, N., & Brown, D. (2004). Learning to work together: Developing academic and community research partnerships. *Wisconsin Medical Journal*, 103(2), 15-19.
- Amuwo, S.A., & Jenkins, E. (2001). True partnership evolves over time. In M. Sullivan & J. Kelley (Eds.), *Collaborative Research: University and Community Partnership* (pp. 25-43). Washington,

DC: American Public Health Association.

Armstrong, C., Becker, K., Berg, K., Hilton, T.S.E., Mowry, D., & Quinlan, C. (2007). Community-university partnerships to bridge the non-profit digital divide. *Partnership Perspectives*, 4(1), 86-94. Retrieved June 1, 2009, from http://depts.washington.edu/ccph/pdf_files/PP-W07-Armstrong.pdf.

Bode, R.W., Novak, M.A., Abele, L.E., Heitzman, D.L., & Smith, A.J. (2004). *30 year trends in water quality of rivers and streams in New York State based on macroinvertebrate data, 1972-2002*. Albany, NY: New York State Department of Environmental Conservation.

Bott, S., Cantrill, J.G., & Myers, O.E. (2003). Place and the promise of conservation psychology. *Human Ecology Review*, 10(2), 100-112.

Cairns, J., Jr., & Pratt, J.R. (1993). A history of biological monitoring using benthic macroinvertebrates. In D.M. Rosenberg & V.H. Resh (Eds.), *Freshwater biomonitoring and benthic macroinvertebrates* (pp. 10-27). New York: Chapman and Hall.

Center for Civic Partnerships (n.d.). *Sustainability*. Retrieved June 1, 2009 from http://www.civicpartnerships.org/docs/tools_resources/sustainability.htm.

Community-Campus Partnership for Health. (n.d.). *Unit 1, Section 1.1: Definitions, Rationale, Key Principles in CBPR*. Retrieved July 5, 2009 from <http://www.ccph.info/>.

Cruz, N.I., & Giles, D.E., Jr. (2000). Where's the community in service-learning research? *Michigan Journal of Community Service Learning*, Special Issue (Fall), 28-34.

Davies, S.P., Tsomides, L., DiFranco, J.L. & Courtemanch, D.L. (1999). *Biomonitoring Retrospective: Fifteen Year Summary for Maine Rivers and Streams. DEPLW 1999-26*. Augusta, Maine: Maine Department of Environmental Protection.

Dorado, S., Giles, D., & Welch, T. (2009). Delegation of coordination and outcomes in cross-sector partnerships: The case of service-learning partnerships. *Nonprofit and Voluntary Sector Quarterly*, 39(3), 368-391.

Hassett, B., Palmer, M.A., Bernhardt, E.S., Smith, S., Carr, J., & Hart, D.D. (2005). Restoring watersheds project by project: Trends in Chesapeake Bay tributary restoration. *Frontiers in Ecology and the Environment*, 3(5), 259-267.

Hellawell, J.M. (1986). *Biological indicators of freshwater pollution and environmental management*. London: Elsevier.

Jackson, J.K., & Füreder, L. (2006). Long-term studies of aquatic invertebrates: Frequency, duration, and ecological significance. *Freshwater Biology*, 51, 591-603.

Keen, C., & Baldwin, E. (2004). Students promoting economic development and environmental sustainability: An analysis of the impact of involvement in a community-based research and service-learning program. *International Journal of Sustainability in Higher Education*, 5(4), 284-394.

Monroe, M.C. (2003). Two avenues for encouraging conservation behaviors. *Human Ecology Review*, 10(2), 113-125.

Natale, D., Brook, K., & Kelshaw, T. (2007). Critical reflections on community-campus partnerships: Promise and performance. *Partnership Perspectives*, 4(1), 44-53.

National CBR Networking Initiative. Retrieved June 1, 2009, from <http://cbrnet.pbworks.com/>.

National Park Service. (2005). *Strategic plan for Valley Forge National Historical Park*. Unpublished Report.

Owens, O. (1993). *Living waters: How to save your local stream*. New Jersey: Rutgers UP.

Parris, T.M. (1999). Connecting with citizen science. *Environment*, 41(10), 3.

Power, J., Cumbie, S.A., & Clarann, W. (2006). Lessons learned through the creative and iterative process of community based participatory research. *International Journal of Qualitative Methods*, 5(2), 1-9.

Rappaport, N., Alegria, M., Mulvaney-Day, N., & Boyle, B. (2008). Staying at the table: Building sustainable community-research partnerships. *Journal of Community Psychology*, 36(6), 693-701.

Rosalesa, J., Montanb, J., and Flavinc, B. (2008, October). *Citizen science as an organizing principle for the work of the EMCs/CACs*. Paper presented at the meeting of NYSAEMC, St. Lawrence University.

Rosenberg, D.M., & Resh, V.H. (1993). *Freshwater biomonitoring and benthic macroinvertebrates*. New York: Chapman & Hall.

Savan, B. (2004) Community university partnerships: Linking research and action for sustainable community development. *Community*

Development Journal, 39(4), 373-384.

Scheuler, T.. (2000). *The practice of watershed protection*. Ellicott City, MD: Center for Watershed Protection.

Schultz, P.W., & Zelezny, L. (2003). Reframing environmental messages to be congruent with Amercian values. *Human Ecology Review*, 10(2), 126-136.

Stoecker, R., & Schmidt, C. (2008). *The community side of service-learning*. Retrieved June 11, 2009, from <http://comm-org.wisc.edu/sl/page.php?13>.

Sustainability toolkit: 10 steps for maintaining your community improvements. (2001). Center for Civic Partnerships, Public Health Institute.

Watterson, N.L.(n.d.). *We make the road by writing: Creating a disposition toward social justice in first year writing intensive seminars*. Unpublished manuscript.

White-Cooper, S., Dawkins, N.U., Kamin, S.L., & Anderson, L.A., (2007). *Community-institutional partnerships: Understanding trusts among partners*. Retrieved June 11, 2009, from <http://www.cdc.gov/prc/partner-communities/trust-among-partners.htm>.

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