CASE STUDIES: PROMISING PRACTICES FOR COMMUNTY PARTNERSHIPS

A CALL TO SUPPORT MORE INCLUSIVE APPROACHES TO PUBLIC PARTICIPATION IN SCIENTIFIC RESEARCH

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ASSOCIATION OF SCIENCE-TECHNOLOGY CENTERS INCORPORATED

The **Cornell** Lab of Ornithology

CASE STUDIES

This collection of case studies serves as an appendix to the report *Promising Practices for Community Partnerships: A Call to Support More Inclusive Approaches to Public Participation in Scientific Research*[1], a report of a task force comprised of PPSR practitioners and researchers, science center administrators, and experts on Equity, Diversity, and Inclusion (EDI) in Informal Science Education (ISE) settings. The report provides evidence-based recommendations for improving the cultural inclusiveness of PPSR projects and explores the possible role that science centers might play in this effort. The aim of that reprot is to advance the development of cultural competence across the field by highlighting PPSR programs that feature promising culturally inclusive practices. It is part of an initial exploration of such practices to help inspire and inform next steps for the field and to provide guidance for scientists and science educators who are organizing, managing, creating, or expanding PPSR projects.

A key component of the task force's efforts was the production of the case studies presented here. The case studies represent a wide range of involvement in PPSR and PPSR-related activities. Some focus on the efforts of PPSR practitioners to engage culturally diverse communities. Others focus on efforts to incorporate EDI into the field of PPSR more broadly. Some of these case studies say more about the organizations which incorporated existing PPSR projects into their programs. These help provide some insight into the variety of organizational missions that might be served by PPSR and of how projects can be adapted to meet the needs of local organizations. Each case study provides compelling examples of one or more promising practices. Again, not all practices are required or even relevant to all projects. However, beyond the promising practices, each interview also provides insights on additional topics of interest. Collectively, the case studies provide a small but suggestive glimpse into the variety of roles and approaches that exist within the ongoing effort to make PPSR more inclusive for culturally diverse communities. We wanted to create a space to bring together different voices within this effort and invite others to join the conversation.

[1] Porticella, N., Bonfield, S., DeFalco, T., Fumarolo, A., Garibay, C., Jolly, E., Huerta Migus, L., Pandya, R., Purcell, K., Rowden, J., Stevenson, F., and Switzer, A. (2013). Promising Practices for Community Partnerships: A Call to Support More Inclusive Approaches to Public Participation in Scientific Research. A Report Commissioned by the Association of Science-Technology Centers, Washington, D.C. Available at http://citizenscience.org/promisingpractices.

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Organization Name: California Academy of Sciences (http://www.calacademy.org/)

Project Name: Careers in Science Program (http://www.calacademy.org/youthprograms/careers-in-science)

Interviewee: Roberta Brett, Senior Science Specialist, California Academy of Sciences

Promising Practices Highlighted in this Case Study:

Provide concrete benefits for participants

Build on what's familiar

Develop collaborative partnerships

Be flexible and adaptive

Offer genuine, equitable, and sustained personal contact with the community

Uncover and address additional context-specific barriers

CONTEXT

This is a science engagement and capacity building program to broaden participation from underrepresented groups in the scientific community. The Careers in Science Intern Program (CiS) is a multi-year, year-round, work-based science education and youth development program for young people from groups typically underrepresented in the sciences. Interns primarily work at the California Academy of Sciences (CAS) facility in Golden Gate Park, and occasionally attend off-site events and field trips.

Created in 1996, the Careers in Science Intern Program provides San Francisco youth from communities traditionally underrepresented in the sciences with opportunities to immerse themselves in the natural world, develop life and job skills, receive college and career mentorship, and learn science and sustainability concepts in an authentic, paid work environment. The program provides hands-on science and youth development experiences both in the Academy and out in the field, as well as exposes interns to professional role models and mentors that are leaders in their field.

The program strives to increase the diversity of the scientific workforce and change the common perception that science is only for the elite. Therefore the program's primary target are youth who have the interest and spark in science, who are motivated and able to fulfill the expected time and commitment, but for whom the program would provide the critical difference in pursuing a higher education degree and career in science, engineering, math and technology. The program's alumni have gone on to earn degrees in Biology, Environmental Science, Engineering, Geology, Public Health and many others. We encourage San Francisco youth that are interested and to learn more about the CiS Program below and apply to be part of our scientific community.

The Careers in Science (CiS) Program intends for interns to represent the culturally diverse San Francisco Bay Area. The genesis of the program has always been to engage those youth from underrepresented groups who aren't typically museum goers, and to get them to become more familiar with science and the California Academy of Sciences (CAS).

The program aims to engage those students who have a spark of interest in science to engage them more deeply in science through understanding the scientific process and increasing science literacy. The program does not expect all students to become professional scientists. The program intends that interns, through their experiences in learning about science, in teaching others about science, and in doing or engaging in scientific research or husbandry, will graduate from the program having a better understanding about the scientific process. And the hope is that this new understanding may make them a more informed citizen when making decisions, or voting on policy decision that have something to do with the environment or science.

CiS started out as a youth development program working with more at-risk students from the SF Unified School District focusing more on job skills, but has now evolved into more of a science education program to get youth to become more involved in science, and to explore careers in science through training, interacting with scientists at the CAS, and by going out into their own community to teach other youth about science.

PROVIDE CONCRETE BENEFITS FOR PARTICIPANTS

Each year CiS takes interns on a week-long immersion experience in nature and deeply engage them in science. The immersion experience and the one-on-one mentor contact they have with a CAS research scientist or aquarium biologist are reported to be the two most pivotal experiences leading an intern to actually choose a higher education science major and a career in science. Throughout the program they gain experience with the following:

- Learning about science at trainings, lectures, workshops, and conferences
- Teaching science to the Academy's audiences
- Conducting scientific work with Academy scientists and in field studies
- Participating in citizen science projects as part of the program

BUILD ON WHAT'S FAMILIAR

CiS engages the intern's family and friends in the annual Careers in Science Family Night at the CAS to help them understand what the youth are doing and also to involve them in learning about science. Additionally, CiS partners with other museums in the Bay Area to host collective teen night events bringing youth from various museums together around science.

DEVELOP COLLABORATIVE PARTNERSHIPS / BE FLEXIBLE AND ADAPTIVE

As part of the "Learn Science, Teach Science, and Do Science" approach, interns teach the diverse public audiences visiting CAS through demonstration stations. The interns have also visited middle schools in the Bay Area to reach out to younger audiences, and interns have participated in community service projects, like habitat restoration. Each year getting out to the schools is the best way to let students know about the program. CiS

recruiting has become more targeted. CAS staff make school contacts and visit schools to make presentations to students about the program. The interns have also been very good ambassadors and let other students know about the program.

Interns see themselves as being scientists and part of a larger community. They really get the values and importance of what they are doing. For example, interns have taken the initiative to apply for a grant on their own to host several youth led community workshops. Program staff also show that they are interested in the academic success of the interns, and demonstrate to them that they are vital members of the Academy community. We all care about what happens to them and want to set them up for success, whatever their education and career choices.

Getting their input in the program development is critical. For example, CiS conducted a survey to ask the interns what they wanted to learn in the Africa Biodiversity program before it was designed. CiS also offers interns a diversity of methods and opportunities to engage them in science training. Additionally, the program works to make the experiences less like school and more hands-on inquiry-based extensions.

It is important to incorporate youth voices in the program development process. Involve them early on. Asking them what they want makes them feel that they have ownership in the program. CiS has a Leadership Council (like a peer advisory board) to the program staff, and they meet twice a month with program staff to keep staff updated on student interests and needs.

Along with teaching science to the Academy's audiences, participants also contribute to an intern blog (http://www.calacademy.org/blogs/careersinscience) to offer the public and other students a unique view inside the program from the intern's perspective.

Uncover and address additional context-specific barriers

In the first year of the program, an online-only application was tested which did not work very well. There was a problem with students applying electronically and the program was not sure why. Roberta speculated that it might not have worked because some students don't have computers at home.

Students can also be inaccessible. The applications fluctuate each year. Some years they get 150 applications, while this past year they received closer to 100 applications. This may be happening in part because it is a challenge to get on the school schedule to visit classes or attend assemblies. Although presentations to schools are the best way to reach students, it is an ongoing challenge to get on a school schedule to present to students. Furthermore, high school students are involved in so many things and, even though this is a paid internship, the program is still competing for their attention and engagement in the program. Some of the youth are dealing with family situations. Others are experiencing academic challenges. The program tries to accommodate their life schedules. Interns have good contact with staff and the interns are responsible for coming in or calling when they can't show up. CiS wants them to enjoy their time at CAS and not see their participation in the program as a burden.

The goal of CAS is to provide a path and not necessarily a linear path into science through CAS programs for youth who have self-identified their interest in science. Initially, some CAS stakeholders wondered that, if students did not choose to go into careers in science after completing the Careers in Science Program, then what was the

program really doing? There were also generational biases, and many did not see the value of youth to CAS. That perception has changed over time to support the value of interns gaining an appreciation of the natural world and an understanding of how science works.

The program is now 16 years old. Over time, the Careers in Science interns working on the floor of CAS, teaching and interacting with the public, have come to be seen as an asset. CAS received positive feedback from visitors, docents, and mentors that the interns, "really do know what they are talking about." In addition, as CiS program and public program staff have changed over the years, they have collaborated more on joint projects which has slowly and organically changed the perception of CiS youth and their capacity to effectively interact with the Academy's visitors in a way that is different than how the docents do. Interns fill a niche that was previously absent on the public museum floor.

EVALUATION

The program year begins in June and all students take a survey to assess their attitudes and perceptions about science and how they perceive themselves as scientists. They are surveyed again at the beginning of every program year to assess how the program may be changing their attitudes and behaviors. Additionally, CiS conducts a survey to gauge student satisfaction and impacts of certain components of the program like lectures by guest speakers, and looks at how they measure against field work or other training components. There are 150 graduates of the program to date.

HOPA MOUNTAIN AND THE NATIVE SCIENCE FIELD CENTERS

Organization Name: Hopa Mountain (http://www.hopamountain.org)

Project Name: Native Science Field Centers (http://www.hopamountain.org/NativeScience.php)

Interviewees: Helen Augare, Director, Blackfeet Native Science Field Center; Bonnie Sachatello-Sawyer, Executive Director, Hopa Mountain

Promising Practices Highlighted in this Case Study:

- Build on what's familiar
- Develop collaborative partnerships
- Offer genuine, equitable, and sustained personal contact with the community
- Be flexible and adaptive

CONTEXT

The three Native Science Field Centers (NSFC) offered offer year-round environmental science field programs that respectfully integrate traditional ways of knowing, Native language, and Western science methods to engage Native youth in environmental conservation and science. The NSFCs engage youth and adults in outdoor science and cultural programs to encourage their long-term involvement with their environment. They also provide a STEM career ladder for youth and adults to develop scientific expertise, knowledge of monitoring and an understanding of management of local lands. This case study focuses on the efforts of the NSFC at Blackfeet Community College in Montana, but also makes reference to the two other sites, Oglala Lakota College (OLC) in South Dakota, and Wind River Indian Reservation in Wyoming.

In order to have culturally relevant PPSR programs you have to start with grounding students first in their cultural connection to plants and animals; the significance; how to care for them; uses; old relationships that are integral to understanding community relationships with animals. All of that was done before engaging with any field techniques.

We really focused on relationships with animals and plants. We would always choose a traditional technology to explore, like the relationship between willow trees, the backrests in lodges, the stability of the tipi, even down to the sinew that was used to tie the tipis. Then they went out into the field, they identified scat (animal droppings) and sheds (fur) – where we don't see the mammal, but understand that it's their habitat. In addition, we were learning how we can use these remnants to improve our lives, both physically and spiritually, emphasizing the symbiotic relationship between human beings and other animals. So we were exploring traditional technologies using scientific processes.

Starting with the cultural grounding helped to reinforce traditional values – how much we take, what is the protocol, only taking what you need, having a purpose for what you take, and leaving an offering. Kids would become so hyperaware that they didn't want to walk in order to avoid being destructive. It was transformational to watch their awareness change.

We started with identification (how will we identify species?). We did field visits to all kinds of places (sacred, environmentally important, their own backyards), all of which was connecting them to their place – their relationship to the world. Kids had to know why all of this was important before doing scientific data collection.

We had originally started with a community gathering where they brought in an Urban Watch program from the Field Museum and got training in that program, whose aim was to create biodiversity. It didn't quite fit because the community was already abundant in biodiversity. The community wanted to focus on the identification and inventory of culturally significant plants and animals. They created their own taxodata that included trees, plants, shrubs, birds – anything they could think of that they used for food, medicine, ceremony, and relationships in general. That's how they built the program. They were able to take from the taxodata sheet to find the stories, songs, and language to implement a full program. That was the common thread for all three sites. Parents also had input into the design of the program. For example, if parents wanted students to learn specific tasks (like tanning hides), that was incorporated.

One lesson learned is that for it to work it had to be a seasonal program, to align with the presence of certain species. It also helps to confirm with students their connection to place. We reviewed other types of field programs and their design and chose what was most culturally relevant. After piloting at Blackfeet, we were able to take aspects of the program model developed there (creating a community advisory board, finding different recruitment techniques, finding different local presenters - professionals in their own right - that tied all that knowledge together) to train the other two Field Centers on their projects to replicate the programs.

Each season opened with an orientation session and ended with a closing session. The opening session identified learning goals and objectives, and the closing session primed the students for the next season. We incorporate/ emphasize traditional values and value-based practices with students explicitly at the beginning of each program year. All students start at same level – we are all scientists. At end of the year of gathering, kids shared posters of findings which they developed in partnership with older students (high school and college undergrads). The first elementary school students are now high school seniors who we're already seeing in leadership positions. Each site has its own closing, but they set aside one week for all three programs to come together to do activities and peer sharing. Younger students would do skits (elementary students did a native language skit about new species coming to the area). OLC did media and photo stuff. Parents were there as chaperones, and each site could select 3-4 community members to participate in this week together. This has happened at Yellowstone, which all three tribes have in common.

The community advisory boards provide in depth knowledge of the places, making connections to resources and people (especially those who can teach songs and language and stories). The stories are thousands of years old and may be family stories, or creation stories. Kids, as well as parents, find value in this approach. They know

that the next season there will be changes based on the relationships they've built in the previous season. Once all three sites had the framework and the process to work from, each program was able to plug in the appropriate cultural pieces.

To form the community advisory boards, project directors went out to the community to build a network of:

- Individuals who were fluent speakers

- Professionals who have high cultural knowledge as well as professional training (any kind of STEM area/career)

- Elders

- Parents

However, the board composition is very fluid. Anyone can come in and provide input at advisory board meetings. This keeps the program innovative and community members consistently engaged and willing to be engaged for feedback. The strength of the community advisory boards also helps mitigate director turnover.

We initially tried to recruit students through the schools, but the challenge was that kids brought their social issues from the regular classroom into the program. We initially had a lot of difficulty getting students to buy into the program design of a Native Science Field Center at school. But once the program was linked to a college campus, where they didn't see themselves as classroom students, but instead recognized themselves as unique students at the college or unique to their school environment, the behavioral mindsets shifted. They were then better able to create their own learning environment – taking off the school hat and putting on the science hat. Parents noted the attitude shifts with learning overall and students' attitudes about going to school. Participation gave them a voice and empowered them to share their experiences in the classroom.

Once we were able to recruit older siblings, the younger siblings would follow. This created an automatic feeder of participants. So we began focusing on recruiting through families and siblings. We also did newspaper ads. Most of the students heard about the project from friends and family. The Field Centers have high retention due largely to recruitment through parents. However, we found that even students with little parental support would self-select in. 95% of the students attend the entire summer program.

These programs have to be built on the needs of the community. They have to be locally controlled and locally driven. Adaptations have to be at the outset, not as add-ons. So many projects originate at universities and want to train communities to do them. That model needs to be flipped to start with the communities – at minimum co-creation from inception (even before funding). Funding must trickle down to communities. Where that happens best is when local communities define how they want to use it. Then it will correspond to the resources they want. People make assumptions that there is not scientific work happening in tribal or rural communities, and that is not true. Acknowledging that there is excellent research happening in tribal communities should be the starting place.

CULTURALLY APPROPRIATE EVALUATION

We had a leader in culturally appropriate evaluation from the start in Shelly Valdez. What we would miss with a majority representative would be the shared vision. It would have taken each site so much longer to get a traditional evaluator onboard with the program's philosophy. Shelly was part of the program so that she could gain experience first-hand to be able to tell the story. As the program evolved, they moved away from the traditional qualitative study toward other qualitative measures: attitude change, increased confidence, taking initiative to create new projects to benefit community. You can see that Shelly's large scale supplemental study of seasoned participants saw significant gains in student knowledge and confidence in science, native language, and native knowledge – it's all integrated. Another project, Native Waters, had a very traditional evaluation. That project convinced them that they needed to have an evaluation that was culturally relevant from the outset.

ROCKING THE BOAT'S WADING BIRD AND SHOREBIRD FORAGING SURVEY

Organization Name: Rocking the Boat (http://www.rockingtheboat.org)

Project Name: Wading Bird and Shorebird Foraging Survey

Interviewee: Chrissy Word, Director of Public Programs, Rocking the Boat

Note: Information was also integrated from a project report at http://www.harborestuary.org/grants/reports/RTB_FinalRprt_2012.pdf

Promising Practices Highlighted in this Case Study:

Provide concrete benefits for participants

Develop collaborative partnerships

Uncover and address additional context-specific barriers

Context

Rocking the Boat is a youth development organization in the Hunts Point section of the South Bronx that empowers young people challenged by severe economic, educational, and social conditions. Students work together to build wooden boats, learn to row and sail, and work on restoration projects in their local urban waterways. Since 2010, Rocking the Boat students have been participating in a citizen science project, the Wading Bird and Shorebird Foraging Survey, developed by New York City Audubon and New Jersey Audubon to monitor the foraging behaviors of wading and shore birds in the estuary portion of the Bronx River.

Programmatic goals include: Exposing young people to future academic, professional, and personal opportunities and introducing South Bronx community members of all ages to their local natural environment and to actively contribute to its restoration and preservation. The data gathered by the students goes into a larger database of information on the bird species presence and activities around the New York Harbor, with the ultimate goal of understanding how the birds are using the harbor and how best to protect important sites for the species.

Up to 1,000 students participate in the On-Water Classroom Program per year including 10 students from Arturo A. Schomberg Satellite Academy, a "second chance" high school (designed for young people who have struggled to succeed in traditional learning environments and are at risk of aging out of the public education system), who participated in 26 sessions and were the primary data collectors for the shore bird portion of the project during the spring 2012 semester.

Between 16 and 24 young people participating in the Environmental Job Skills Program collect data for the project, document results, deliver data to project partners, and educate the general public at community events including Rocking the Boat's weekly Community Rowing Program during the summer. These are high school students, primarily in 11th and 12th grade and from 16 - 19 years old. The ethnic makeup is largely African-American, Latino, and South Asian.

The students collect all the data on the river/estuary for the monitoring project from boats. They are looking for all wading birds and shorebirds they see on the river and also collect data on a brief (3-minute) behavioral observation of the wading birds. We have other citizen scientists that survey land-based points that complement the data collected on water. After data collection the students upload their observational data into an online database that all our citizen scientists use. They also upload data on the birds that they've seen to eBird, which gives them a chance to explore the sighting data in a larger context.

DEVELOP COLLABORATIVE PARTNERSHIPS

Rocking the Boat is developing community advisories based on water quality monitoring (another PPSR project, not the bird monitoring project mostly covered here), which are directly related to the community's use of the Bronx River. This reflects a value important to the community.

Also, interacting with scientific partners, be they scientists, educators, administrators, is an important way to help participants feel that they are real players in the project. If possible, include participants in the design of a new or continuing project.

UNCOVER AND ADDRESS ADDITIONAL CONTEXT-SPECIFIC BARRIERS / PROVIDE CONCRETE BENEFITS

There are three main categories of barriers: Academic challenges, financial challenges, and lack of interest.

Academic. Students have so much remediation and are so focused on finishing high school that they have little interest or energy in applying themselves to this project that may not help them academically. Also, there's often a psycho-emotional barrier, a mental block or fear within themselves, that they don't have the skills and aren't going to "get it." One way of addressing this is to offer class credit for participation in the program, which might be science or social studies or English. Also, start out being very deliberate with the students on what the process is for the project, structuring it so it is step by step and they will be able to master it. It's important to include activities that are fun and to be clear that they aren't being graded. BUT they are contributing. The fact that they enter their data into online databases and can see that their data are contributing to a bigger picture is important, adding validity and credibility to their efforts and the program. Let them know that scientists are using this information and that they're an important part of that process (this helps communicate the importance of data quality too).

Financial. Students are pressured by their families to work as early as freshman year. During the school year it's "OK" (but not ideal) for them to spend their time with Rocking the Boat but it's not OK during the summer, so they miss the ideal field season. We pay the students a stipend ($575) during the summer, which can act to invite younger (9th/10th grade students) to participate. Older students can get better-paying jobs so it may not be as much of an incentive. However, Rocking the Boat encourages older students who qualify to enter the Environmental Job Skills Program which is a paid apprenticeship that starts at minimum wage.

Lack of interest. I did my first water quality testing on the Bronx River with high school summer interns back in 2003. I assumed then that they would be interested in everything that we were doing but realized quickly that they were not. That's because they had never done anything like that before and also because they thought the Bronx River was disgusting and dangerous. They did not believe that it harbored life or that it is actually an important biological corridor.

In the urban setting, it's important to understand up front what people's attitudes are toward the project and all of its elements. Those attitudes have to be accepted and respected. Also, the training process should integrate basics that help participants to truly understand the issues and how they play a role, including how they impact the issue as well as how they are impacted by it. It is also important for the project administrator to try to connect participants with the wonders of the project. Every PPSR project presents some biological or astronomical element that is fascinating. I always use these as "hooks" to get my participants interested.

Additionally, there are three full time social workers that work with the kids (for the whole organization, not just PPSR participants). Students have to feel safe and comfortable (emotionally, physically) as they have so much going on outside that pulls them away. You have to look at where the students are coming from – How are they doing academically? Are they safe at home? Are they eating enough? There's always healthy food available at Rocking the Boat. Program Assistants are also hired from a pool of former participants, which shows a couple things; there are JOBS that people can do if they excel in this type of activity and it's relatable and empowering for the students to see people that look like them in positions of authority.

Etc.

Allowing appropriate time for training, especially for young participants, and access to scientific partners are key in my mind. Participants need proper training so that they can feel that they are useful and truly needed. It also ensures more accurate data collection.

Talk to others who have already done similar projects when starting the planning process and find out what went right/wrong for them. For teachers, try to think of these projects as on-going ones and build in ways to make them as sustainable as possible. Students and other participants are more likely to see the credibility in a project that has a long life (especially if its history is built into the training to show already measured results) or at least the prospect of one. Even though there will be new students or participants each season, an on-going project can take on a new life and former students/volunteers can often be great resources for training new ones. Finally, proper survey equipment and materials are essential.

TUALATIN RIVERKEEPERS

Organization and Project Name: Tualatin Riverkeepers (http://www.tualatinriverkeepers.org)

Interviewee: Monica Smiley, Executive Director

Promising Practices Highlighted in this Case Study:

- Build on what's familiar
- Develop collaborative partnerships
- Offer genuine, equitable, and sustained personal contact with the community

CONTEXT

Tualatin Riverkeepers (TRK) is a watershed-based environmental organization founded in 1990 in Washington County, Oregon, just west of Portland. The organization was founded by environmental advocates and scientists that enjoyed paddling on the Tualatin River. In an effort to increase awareness of the River, its beauty, and its challenges, they coordinated guided canoe trips on the river. Soon after its founding, TRK joined the Waterkeeper Alliance, an association of environmental organizations with the mission of having one "Keeper" to protect every river in the United States and now internationally.

TRK engaged hundreds of people annually in recreation and volunteer programs. The population served was nearly 100% White. The cultural profile of the Tualatin River watershed was changing. In Washington County, the Latino community grew from 14,401 (5% of all residents) in 1990 to 86,400 in 2011 (16% of all residents).

In an effort to engage diverse community members, TRK formed partnerships with organizations that served the Latino community beginning in 2001. In ten years, TRK was not able to engage Latinos beyond co-sponsored events and one-time volunteer opportunities. None of the hundreds of participants sought out additional volunteer and/or organizational leadership opportunities like their White counterparts and TRK didn't know why.

In 2010, TRK formed a partnership with the Center for Diversity and the Environment (CDE), an organization dedicated to diversifying the environmental movement, to begin to accurately represent the people that live in the community it serves.

TRK's Vice President and Executive Director both participated in in-depth leadership training with CDE and the Center for Whole Communities. With a new understanding of racism in America and a set of skills for building relationships with communities of color, TRK began to rebuild relationships based on shared values.

TRK did encounter initial resistance from some members of the Board and staff. There was a sentiment commonly expressed that those who are interested in environmental issues and volunteerism will seek out TRK. Another commonly expressed idea was that communities of color are of low socio-economic status and don't have time to

volunteer as they are busy meeting basic needs for their families. TRK engaged all Board and staff in training to dispel these and other myths and chart a course for equity, diversity, and inclusion (EDI). They began by developing shared language for EDI.

EDI as defined by Tualatin Riverkeepers (TRK) leadership team November 12, 2011:

- *Equity* is fairness of opportunity for access to clean water to be achieved through effective strategies, systems, and educational tools;

- *Diversity* is a representation of the differences, similarities, and uniqueness of the dynamic community of the Tualatin River watershed;

- *Inclusion* is deliberate, respectful engagement of diverse interests and populations.

A EDI committee of Board, staff, and volunteers was formed to help guide EDI at TRK. TRK began addressing internal systems that were barriers to engaging communities of color. TRK looked at its programs and events and created tools such as Spanish language information for volunteers. Communities of color began to participate in events. TRK redeveloped its board recruitment strategy to emphasize recruitment of people of color. People of color began to join TRK's leadership team. TRK intentionally made efforts to engage community members of color by inviting them to participate and they did.

In order to integrate EDI measures throughout the organization, TRK Board and staff gathered to re-establish the organization's mission and vision and develop programs, events, and messages to appeal to broader audiences. Watershed conservation program ideas are now shared through family, health, and education messages. They are also shared in a new way. They are positive, focused on involvement and outcomes.   They are no longer polarizing, "if you don't act now to protect the environment, something bad will happen."

The relationships TRK built with organizations that served communities of color changed with one question: "What are the outcomes and programs you want, that we can help you achieve?" The question TRK had been asking before was, "would you like to participate in our program?" Today TRK develops projects collaboratively with partner organizations.

TRK evaluated its programs quantitatively by counting participants. TRK saw change this way. The most valuable form of evaluation was in relationships forged and programs built. The new energy brought to TRK by EDI has also made TRK more relevant because it represents a broader segment of the population. It's also a lot more fun to be a part of!

Organization Name: Cornell Lab of Ornithology (http://www.birds.cornell.edu/)

Project Name: Celebrate Urban Birds (http://celebrateurbanbirds.org/)

Interviewee: Karen Purcell, Project Leader, Celebrate Urban Birds

Promising Practices Highlighted in this Case Study:

Provide concrete benefits for participants

Build on what's familiar

Develop collaborative partnerships

Be flexible and adaptive

Offer genuine, equitable, and sustained personal contact with the community

Uncover and address additional context-specific barriers

CONTEXT

An international PPSR project designed to engage underserved communities

OVERVIEW OF THE GOALS AND BENEFITS OF THE PROJECT

Celebrate Urban Birds (CUBS) grew out of prior work we had done with NSF supported citizen science projects focused on underserved communities (including failures and successes) as well as focus groups we conducted in cities across the U.S. with Latino communities in placed-at-risk communities (youth, caregivers, and group leaders). We set out to create a citizen science project that would be of interest to and relevant to the communities we serve. We try hard to focus on the strengths of the communities we are working with. We put a lot of energy into creating a dynamic dialogue with communities so that the project is continuously changing in response to feedback and initiatives from communities. It is not a static project.

CUBS works on two levels – we have extensive web-based initiatives and intensive, in-depth community work and youth development. We focus much of our time on face-to-face outreach and co-trainings. Thus, although we are a continental project, we are also a local project responding to and reflecting individual communities.

The goals of the project are primarily to achieve a more equitable representation of all audiences in participatory science. Yes, we are interested in learning more about how birds are using green spaces in cities, but this project started because we realized that broad scale citizen science projects were not inclusive – something needed to change.

The Cornell Lab of Ornithology and the science community benefit from this project because we connect completely new audiences with birds, data collection, and science. We learn from communities and are able to enrich our programs and participatory science projects thanks to their creativity and feedback. Thanks to local creative outreach programs we support, we are able to inspire other similar communities, organizations, and programs. In addition, the data we receive is from locations where we have little if any bird data.

The communities we serve and the community based-organizations we work with also benefit. Some of these benefits include health benefits (spending time outdoors/connection with nature), educational benefits (learning about the process of science investigations/STEM careers/critical thinking/communication), community improvement (stewardship), developing curiosity for the natural world, and we help community based organizations reach goals that they have set in areas where we have expertise.

WHO INFORMED THE PROJECT

Our design was informed by focus groups, long-term community partnerships, interviews with group leaders, conversations with stakeholders, and learning from a track record of participatory science projects created since 1997 focused on underserved, urban audiences. In addition, group leaders, scientists, educators, and birders informed and contributed to the project's design.

WHO PARTICIPATES IN THE PROJECT

CUBS reached over 1000 organizations in 2012 and through them reached approximately 125,000 people across the continent. Nearly 10,000 individual participants from across the continent (mainly the U.S and Canada) also registered for CUBS in 2012. 25,000 CUBS educational kits were given out this year and approximately 650 people participated in CUBS seasonal Challenges in 2012.

CUBS demographics, based on a survey of 400 organizations that we reach through our web-based initiatives:

- 47% of surveyed CUBS practitioners reported that half or more of their participants were economically disadvantaged.

- 21% reported that half or more of their participants spoke English as a second language.

- 43% reported that half or more of their participants aged 30 and older had no more than a high school education.

- 20% reported that half or more of their participants were Latino and 64% reported that at least a few of their participants were Latino.

- 16% reported that half or more of their participants were African American and 68% reported that at least a few of their participants were African American.

INTENSIVE OUTREACH AND TRAINING

In 2012, we brought approximately 100 underserved participants from across the U.S. to the Cornell Lab of Ornithology for in-depth trainings and workshops for at-risk youth and educators. We reached 41 underserved group leaders through our webinars - approximately 100 more via other organizations' webinars in which we were

featured. We reach thousands more through radio interviews, youth led public service announcements about birds, SKYPE conference calls, and remote workshops. We gave out 15 mini-grants to underserved organizations who worked with 1150 participants in 2012. We worked intensively in person with youth in two at-risk Latino communities reaching 43 underserved youth. We offered remote internships and worked in-depth with 27 underserved youth across the U.S.

ACTIVITIES PARTICIPANTS ENGAGE IN DURING THEIR PARTICIPATION IN THIS PROJECT

Participants get involved with many different activities and at many different levels – ranging from simply learning about the connection between habitat and birds, the benefits of spending time outdoors, and learning about birds, to more in-depth learning like bird identification, bird biology, the process of science, data collection, the value of participatory science, communicating results, gardening for the birds, the connection between arts and science, making scientific presentations, stewardship, and more. In our youth development work, we focus a fair amount on STEM careers, leadership skills, and community stewardship. In addition, through our remote internships, we delve much more deeply into communicating scientific information, getting to know birds, bird biology, critical thinking, the relationship between habitat and wildlife, and the value of green spaces/going outdoors for humans.

WHY EQUITY, DIVERSITY, AND INCLUSION

In my opinion, science does not represent our world – it is elitist – and we turn people off from being a part of it. Science is a tool – an art– and achieving a more equitable representation of all people in science makes that tool – that art-- more exciting, more useful, and more true. As it is right now, science/scientists only see a portion of the picture. There are many "right" ways of becoming engaged in science and of participating in it. I find that science is narrow and limited in its impact because it only represents one narrow world-view. The more diversity we find in the scientific world – the more creativity and more ways of looking at the world we will have. Scientists cannot hope to "translate" scientific results – or conservation initiatives to the larger world if we are not part of that world – if we are narrow in our ways of thinking.

I really believe that the best way to engage new communities is to engage in dialogue—to talk and listen. We have had lots of success partnering with community based organizations of all sorts (businesses, health care organizations, community centers, educational outreach orgs, Latino advocacy groups, churches, etc..) that are embedded in and trusted by the community. To me a true dialogue is key. And this is not easy. It takes an enormous amount of time and commitment and nobody wants to fund it because the results are hard to see. It's important not to engage in dialogue in a patronizing way – what can WE do to HELP you… but to really engage in a conversation. The truth is that the majority of organizations we work with in underserved communities have never heard of us… and don't care that we are The Cornell Lab of Ornithology. One even thought we were "CorningWare" – and seemed disappointed when we clarified. Sometimes the conversation needs to happen about things that have nothing to do with the project -- (Did I just spend two hours talking about our relatives in South America? The best Cuban food? Our kids?) and to be patient. Building trust takes a lot of time and long-term commitment.

Many of the organizations we work with have told us that they have been approached so many times by mainstream Universities or Informal Science Orgs at the last minute to try to add them to a proposal – the idea is that community organizations should jump at the opportunity! But they know that they are simply being used – sometimes even with the best of intentions –but still they are being used. Sometimes they are named in proposals without being asked – simply assuming that grant writers have so much to offer that underserved

communities will be delighted. How could they not be? There is a lot of lack of trust because of this issue — as well as many others.

It takes time to build trust. We've been told over and over that when you work large-scale, these conversations just can't happen — the trust building stage must be abbreviated —that it's just not practical — but it must happen — it takes time. I think gaining trust and committing to working with organizations over the long-term — funds or no funds — is important. Many community-based organizations have high turnover rate — and so the trust building dialogue must happen continually. You can't incorporate or address values and interests of individuals from underrepresented communities if you don't talk to them. All communities are not the same. There are communities within communities and niches within those communities. Each one is unique. There just isn't a magic wand that can address community values and interests. In addition, another key factor is making sure that there is a shared power structure. Really take a look at yourself and your organization and see if the relationship you have with the community based organization and staff there is equal. If it is not, then how can you change that or how can you address it. Transparency is good.

SOME COMMON THEMES WE HAVE FOUND IN OUR YEARS DOING THIS WORK

Communities are interested in:

- Giving back to their community (community service, educational opportunities, mentorship opportunities, etc…)

- Safe educational activities that can involve the whole family

- Educational opportunities for youth

- The opportunity to have educational experiences that might not otherwise be possible

- The ability to reach STEM goals that have been dictated from above

So after many conversations and lots of experience — can I summarize what community based organizations serving underserved communities need? No — each is different and unique. But there are a few common themes:

Face time: We've been told many times that the best 'resource' we can give organizations working with underserved communities is ourselves. Face to face time. It goes back to engaging in dialogue. Listening and talking — trying to figure out what their goals are and what goals we have in common. We've been told that this face time is more important than funds (which comes at a close second). I tend to be shy —and would rather hole myself up in my office than talk to people. People scare me a bit. I still struggle with this. But after years of doing this I have learned that picking up the phone, visiting, skyping, having lunch with, and spending time with others must be my biggest priority in improving EDI. An email is not enough — personal contact is key.

Funds: The reality is that many community based organizations are so strapped for funds and are spread so thin that they just can't engage in experiences that don't meet their communities' basic needs. Funds, even a tiny bit of funds - enough for pizza, supplies, etc. - can be a real help, but if more funds are available, if a grant is written, community-based organizations need equitable payment for the work they are doing.

Continuity: Are you there for the long haul — or are you going to be gone as soon as the funds are gone (or even earlier).

WORKING WITH SCIENTIFIC DATA

I think it takes time -- you cannot expect to jump into data collection unless you have worked hard to co-design the project and it's clear who will benefit from the collection of data.

SOME BARRIERS WE HAVE IDENTIFIED AND ADDRESSED ARE:

- The need to travel to participate in a project – lack of transportation (making sure the project can be carried out completely within the immediate neighborhood)

- Money (no program fees, providing funding for costs associated with feeding participants, staff time, etc..)

- Language (availability of materials, training, support, etc.. in Spanish – making sure that the language used in Spanish and English is conversational and friendly—not uppity – making sure that the Spanish is appropriate for the regional community)

- Fear of failure (providing lots of ways to be successful in the project, flexibility, clarity in terms of what is expected, local mentors, face time, providing lots of ways to participate – through many different doorways – the arts, community improvement, gardening, etc…)

- Illiteracy (providing visual materials in Spanish and English, face time)

- Lack of trust (taking time to get to know participants and being involved throughout— face time)

- Boredom --this is especially true for youth—(handing over the reigns to youth – encouraging ownership of a great majority of the project, implementing ideas generated by youth on a large scale, connecting youth with broader networks of youth that have participated before, implementing mentoring programs, providing lots of ways to participate – through many different doorways – the arts, community improvement, gardening, etc)

- Immigration status (working within embedded community-based organizations, flexibility, face-to-face contact)

- Lack of computers/technology (paper-based materials, face time, flexibility)

ADDITIONAL RESOURCES NEEDED TO MAKE IMPROVING EDI EASIER OR MORE EFFECTIVE

More funds, a network of people interested in working together without competing, more access to media outlets.

ADVICE I WOULD PROVIDE TO SOMEONE STARTING A NEW PPSR PROJECT

Talk to the people you want to include. Don't make assumptions. Be flexible. Take your time. Listen. If you want to work with Latinos – hire Latinos. Don't be patronizing. Think about power structure. If someone doesn't respond at first, don't make assumptions about why – think broadly about why they are not responding – open the channels of communication. Don't give up. Small steps are key.

CULTURALLY SENSITIVE EVALUATION

I think this is key – if you do not have culturally sensitive evaluation you run the risk of alienating the communities that you've worked so hard to work with –and results can easily be misinterpreted.

Organization Name: Camp Compass Academy (http://www.campcompass.org)

Project Name: Celebrate Urban Birds (http://www.celebrateurbanbirds.org)

Interviewee: John Annoni, Founder, Camp Compass Academy

Promising Practices Highlighted in this Case Study:

Provide concrete benefits for participants

Build on what's familiar

CONTEXT

An international PPSR project was adapted and implemented at a local level through a partnership with the leader of a community organization serving urban Latino youth.

Camp Compass introduces the urban youth of Allentown, Pennsylvania in grades 5 through 12 to a variety of outdoor activities, community businesses and working role models. The goal is to teach kids conservation and sportsmen's philosophies and activities. Camp Compass is a nonprofit program developed for urban, disadvantaged youth by John Annoni. His staff of volunteer mentors provides hunting, fishing, archery, tutoring, social guidance, and other outdoor activities for inner city youth. The children involved are helped with life's challenges through a structured program and role modeling to foster self-esteem and positive choices. Camp Compass Academy takes a multifaceted approach to youth development. Citizen science is just one piece of this program.

Founder John Annoni is an educator in the Allentown School District, author, and inventor who started Camp Compass in 1994 out of the back of his 2-door Ford Explorer and developed it into a successful, federally recognized non-profit organization.

John developed a multi-tier program structure with the intention of slowly developing youth through long-term relationships. The youth are expected to report in once each week and complete tasks in exchange for respect, expert life advice, connections with local businesses with potential jobs, and pizza parties. The focus is on developing a work ethic and a recognition that people care about them and what they do. Over the course of several years, participants can be promoted up a 5-stage structure into more responsible positions that eventually include mentoring younger less experienced participants. John models his relationship with the kids after gangs where there is a sense of family, structure, expert advice and where the kids feel that they can make mistakes and still be loved.

The tiered system provides the kids with incentive to do well and stay engaged. Providing more benefits, responsibility, and opportunities to feel pride in oneself over time has worked well for this program. Over time, kids are provided the opportunity for additional outdoor trips with adult role models, responsibilities like taking

equipment (e.g. camera) home with them and performing extra administrative duties, and the chance to become mentors of newer participants.

What made data collection most appealing was the fact that kids were paid for it and the fact that Celebrate Urban Birds (CUBS) was developed and administered at Cornell University. Kids were explicitly told that they were in effect working for scientists at Cornell University. This explicit understanding which connected their activity to a larger professional picture, along with the belief instilled in the kids by the program leader that they could do this effectively, provided them with a sense of responsibility and pride and it was something they could put on their resumes and college applications. The kids were told that somebody "out there" needs your help; that they could do something good for others.

The only challenges they experienced were with bad weather, sirens and other urban noise scaring off birds.

Primary resources that help in implementing CUBS are money for youth incentives/payment and food. Providing food is critical when working with underserved youth. A camera would make data collection more engaging and provide a carrot for youth who could be allowed to take the camera home, instilling responsibility and trust.

LA JOVEN GUARDIA DEL TEATRO LATINO (CUBS)

Organization Name: La Liga (The Spanish Action League of Onondaga County, Inc.)

Program Name: La Joven Guardia del Teatro Latino (The Latino Theatre Youth Troupe)
(http://www.laligaupstateny.org/theatre.php)

Project Name: Celebrate Urban Birds

Interviewee: José Miguel Hernandez, Program Founder and Director, La Joven Guardia del Teatro Latino

Promising Practices Highlighted in this Case Study:

- Provide concrete benefits for participants
- Build on what's familiar
- Develop collaborative partnerships
- Be flexible and adaptive
- Offer genuine, equitable, and sustained personal contact with the community
- Uncover and address additional context-specific barriers

CONTEXT

This is an example of a local community organization incorporating a continental PPSR project into their programming. La Joven Guardia del Teatro Latino, a youth theatre program founded by José Miguel Hernandez with La Liga is funded by La Liga, New York State Council on the Arts, and donations from members of the local community. The theatre troupe consists of residents of poorer areas of Syracuse, NY with a large Spanish-speaking immigrant community. Troubled high school youths with low self-esteem due to their accents and skin color from low income families that have little time and resources to help them.

Jose Miguel meets with the youth group every week, leading them in discussions and role-plays focusing on their hopes for the future and how they want to attain their goals. The program offers performing arts workshops, theater exercises, dramatic movement, improvisation techniques, and creative expression to help build self-esteem. Through creative activities, like role-plays, focusing on the youths' hopes and their plans for attaining their goals, they address prevention measures, consequences, and responsibilities. They offer workshops where the youth can explore different aspects of who they are and who they want to become.

José Miguel has established himself as a trusted role model with these youths and their parents. Some of the parents were not engaged initially due to long work days, no car, little education, and in some cases, an inability to read. He also initially met some resistance from the kids given the fact that some of them could not read and had very low self-esteem, both of which posed challenges to participating in theater. José Miguel did what he could to meet the kids where they were and work with them. He taught the kids to read. Some kids stayed on, others left.

His association with La Liga, a trusted community organization for this group, also helped him in his recruitment efforts. His program is very family oriented now with youth participants who don't want to leave it. He presents himself as an inquisitive explorer, an investigator of the world around him, and his kids trust and respect him to the point where they will go along with whatever crazy new pursuits he comes up with because they trust that he has their best interests at heart. Celebrate Urban Birds (CUBS, see the CUBS case study, p. A.16) has become one of those pursuits.

CUBS provides instruction and relevant materials for engaging underserved communities with nature and science. It is a flexible framework that incorporates PPSR (identifying, counting, and submitting bird observations) into a collection of more accessible activities focused on the arts, greening, and community involvement.

José Miguel saw in CUBS an opportunity to further his efforts in building self-esteem, respect, and community engagement. He feels learning about local birds is good for his kids and for the community. He will do anything that promises to increase his kids' confidence and engagement while also staying culturally connected. The fact that CUBS is based at Cornell University also appealed to José Miguel as he wanted to encourage and support existing desires among his kids to attend university. He also felt there were things the kids could learn about themselves by observing and learning about their relationship to birds in their local environment. Finally, he felt the other components of CUBS, particularly the arts component, could be easily implemented for his group and would serve as an effective bridge to the PPSR activities.

José Miguel also received some need-based funding from CUBS to help administer the project with his group. This allowed José Miguel to pay his kids $10/hour for 10 hours of work. He says this makes them feel important and helps motivate them to commit to the tasks he presents them with.

This group was still in the early stages of PPSR, learning about birds and getting familiar and confident with the idea of collecting and submitting observational data. José Miguel had just recently asked CUBS project leader Karen Purcell to visit his group to show them exactly how to collect and submit data.

When asked what additional resources could make the project run more smoothly, José Miguel responded, two or three computers, internet connectivity, a camera (for documenting participation).   He only has one computer for the entire group at the moment. Additional money is always useful, for transportation, food, soil (part of the greening activity), access to pretty birds, and to impressive experiences (which may require travel).

NEW YORK HALL OF SCIENCE (BUDBURST)

Organization Name: New York Hall of Science (http://www.nysci.org/)

Project Name: BudBurst
(http://www.neoninc.org/budburst/; http://www.citizenscience.org/contexts/science-centers/cases/features/budburst-at-new-york-hall-of-science/)

Interviewee: Michaela Labriole, Manager of Online Professional Development, New York Hall of Science

Promising Practices Highlighted in this Case Study:

- Build on what's familiar
- Be flexible and adaptive
- Offer genuine, equitable, and sustained personal contact with the community

CONTEXT

As part of the NSF-funded Communicating Climate Change (C3) project, the New York Hall of Science (NYSCI) adopted the BudBurst project to help people understand local impacts of climate change on plant phenology. Somewhat unexpectedly, their workshops attracted a mixed-age crowd (from pre-K to retirement) and, in the interview, Michaela initially speaks about diversity in regards to the diversity of ages represented. But for her audience this also closely correlated with diversity in terms of cultural backgrounds, and she shares insights about designing inclusive programming on both fronts. Michaela was particularly interested that, in many ways, the interests of the diverse audience shaped the design of the workshop activities to be inclusive across all ages.

NYSCI's goal was to create a citizen science project that would help people understand local impacts of climate change. At the outset, they were focused on the subject matter, and not on the audience they might attract. The goal of engaging diverse audiences (here still speaking about ages) really emerged from their project.

NYSCI's advanced planning and reading about citizen science showed mostly either adult or school groups as project participants, or groups that were already formalized (such as scouts). They were expecting primarily adults to sign up and didn't know it would appeal to families with children. Therefore, they didn't design their BudBurst workshops for a wide range of age groups. When registration showed that the ages of workshop participants was going to vary widely – from families with very young children, to twenty-somethings, to retirees – the team thought carefully about how to offer a range of activities to include everyone in a meaningful way, not just "token" engagement. In reflecting on the workshop, they realized that there was a richness to the levels of engagement, with kids getting adults energized, and with adults excited to share their expertise with youth. So, for subsequent workshops, they adopted the goal of making sure everyone was an equal participant, changing some activities and discussion topics to continue the success they saw in the first workshop.

RECRUITMENT

They recruited through their membership list, through email "blasts," and also through Craig's List – they didn't have a lot of time or staff capacity to do more. They really just wanted to see who showed up through those standard channels.

Their membership has a lot of families who were accustomed to NYSCI workshops being very family-friendly and Michaela suspects that they saw this more as just another fun workshop to do with their kids than a "citizen science" opportunity specifically. She did see that a few families had kids who were very specifically interested in trees, but for the most part she thinks they were just looking for something fun to do with their kids.

Not specific to this project, but NYSCI work in general has seen a difference between emailing and online posts, and reaching other audiences who may not be on email groups. Getting into communities, talking to people face to face, showing them who you are is very important. Not everyone has an email address and not everyone feels personally invited by a flyer.

In the years since the BudBurst workshops, NYSCI has started the NYSCI Neighbors program, which is a partnership with schools in NYSCI's neighboring communities of Corona, Flushing, and East Elmhurst. "We're situated in the most diverse county in the country. More than 100 languages are spoken within five miles of NYSCI. We don't have to go looking for diverse audiences." NYSCI Neighbors program staff goes into schools and community centers to get to know people, share information, sometimes take an activity to do. In just two years since the program's inception, it's grown to include more than 400 Neighbor families and partnerships with more than a dozen schools. Teachers and administrators from those schools also participate as Neighbor Members where they receive all the benefits of NYSCI's Membership program as well as have opportunities to participate in workshops, research projects and the design of new exhibitions that will one day be on NYSCI's exhibit floor." That takes a lot of time, but it's been really effective for engaging their local audience. And then making sure that when people do come, it's important to take the time to make them feel welcome, help orient them to the place and how it works.

ENGAGING UNDERSERVED COMMUNITIES

Beyond BudBurst, NYSCI is really attentive to whole-family activities being particularly important for engaging people from cultural backgrounds that are often underrepresented in their museum programming. "We definitely saw that activities that families could do together were bringing in audiences that normally wouldn't be here…."

For these workshops, they did not ask about participants' cultural heritage, and she wishes they would have thought to do so. But anecdotally she notes that there was much more cultural diversity among the families who attended than there was among the "lone adult" attendees. She also noticed a difference in the educational background between the adults with kids and adults on their own. Those on their own would talk about their grad school experiences, for example, while many of the adults who were there with children would mention not having been to college or, for some, to high school. She was pleased at the success of BudBurst at providing a fairly equal footing, across varying levels of education and levels of comfort with science. She attributes this to the fact that everyone can observe. We observe in different ways and people pick up on different things, whether in kindergarten or post-PhD.

How people were involved

They did lots of hands-on activities during the trainings. This training could have all been done, indoors, with powerpoints and handouts. But as a hands-on science center, they made it a point to go outdoors, and pick up leaves, and do activities such as observational scavenger hunts. They found this to be particularly effective at engaging people across ages and experience levels, where kids would find things more than the adults. "Getting people outside really showed everyone that they were on equal footing…. We were seeing that kids were spotting things more than adults. Certain adults were able to identify things more easily. And so people really had to work together, and everyone was bringing their own expertise and skills. The fact that it was very observation-based – and not just observation with your eyes, but touching things and smelling things – is something that everyone can do." She reflected that by doing this together as a group, they saw each other as fellow Tree Trackers and in their later use of the social networking site really felt like part of a community.

The social networking site was set up for all participants, to encourage their regular observations. NYSCI posted activities for families to do together as a group while out observing, something new each month to get people outside to make observations. For adults, they posted articles and information about the science behind what they were doing. What brought everyone together was a forum where people could share information, such as helping each other identify trees. They would also post, "strategies for interacting with your kids, and for interacting with your parents. You don't want the parent just standing there while the kid is doing something; you want them doing something together." Kids don't always know how to ask their parents to be more involved.

What worked well?

From talking with the families, and the kids, Michaela heard from them that identifying themselves as doing science was really important to them. The structure of that program helped boost that identity in a way that school didn't, or their workplace didn't, because the onus was on them to collect that information and talk with each other about what it meant. She also felt that it was particularly meaningful to families to be able to do something together.

"The parents want what's best for their kids. They want their kids to get involved in all sorts of academic pursuits. We see that with our afterschool program, where parents from underserved communities really want to enroll their kids in our afterschool program, but they themselves, as adults, do not get involved in those sorts of things – they wouldn't come to the museum on their own, they wouldn't come to a program on their own. But by creating a program that's not just for the kids, but that the adults can participate in as adults, gets them in the door and gets them doing experiments and doing activities and making observations, so they're not just watching their kids do it but that they themselves are involved, too. Making it something fun for kids helps get them engaged, but the structure of the program kept them engaged."

You didn't have to feel comfortable with science to complete any of the activities. Everyone at the workshops was learning at the same time – there were aspects of the program that were new to everybody in the room. With fun activities, there was no pressure. And everyone has something to contribute.

Specific to participation in a PPSR project, knowing that they're a vital part of the project also makes people more likely to take that risk, to try something. For parents who want their kids to succeed and be part of something special, it's attractive to know that their kids are actually being a researcher and providing real information – they

were excited that their kids could be a part of this. It's a sense of importance, both for parents and adults on their own. Michaela feels this aspect of PPSR made people more likely to sign up, show up, and stay involved.

However, it was difficult to track who was submitting data because they went directly to BudBurst. But from the limited feedback she had, there was a lot of participation right after the training, which tapered off as the season went on so mostly the hard-core participants were submitting (both adults and families). They thought about changing things for the second year to have the data come through NYSCI, but she didn't want participants to have an extra step, or the feeling that she was checking their data. She also wanted them to really know that they are acting as citizen scientists.

ADAPTING A PROJECT FOR UNDERREPRESENTED AUDIENCES

For BudBurst, the materials were great but all in English. Having something that might be in Spanish, Mandarin, or another language might have been helpful. They did have bi-lingual families participating, but all were conversant in English. They could read it, but might have been more comfortable reading it in their native language. With more time, NYSCI might have been able to translate materials. "It's not about ability, it's about making people feel included." Even having just a welcome in other languages could be useful. Their own audiences speak many, many languages, and it's difficult to know which ones to start with if they were to translate.

CHALLENGES

Computer literacy was their biggest issue, with a number of parents not comfortable accessing the website or understanding the social networking. Kids took an active role in helping their parents set up accounts, bookmarking the BudBurst website, etc. The project had a strong digital component, so this was important. Given that this programming took place a few years back before mobile devices were as common, computer access was a concern, but all families did have computers at home. They did consider how they might facilitate things for people if they did not have computers, but this turned out not to be an issue.

WHAT WOULD YOU DO DIFFERENTLY?

It was difficult to tell, on the social networking site, how engaged people were, since you could only see who posted and not who might be reading and accessing information. For the future, they would ask for and invite more check-ins, such as adding a "Like" button... not just for the benefit of NYSCI, but for those who post to see that others were reading and valuing their posts. But she saw it as critical for retention of participation after the training. The aspect of it being a closed site was important in several ways, not just in being secure and safe for youth as well as adults, but also towards the feeling that they were all part of something unique and special.

If they would do this again, they would go through the (more recent) NYSCI Neighbors program to recruit participants. By not having collected info on peoples' backgrounds, she can't say anything for certain, but she thinks that if they used some of their newer recruitment methods they would have attracted a more diverse group. But they weren't recruiting with that in mind at the time.

INCORPORATING COMMUNITY VALUES/INTERESTS

"The value placed on education is key, and is a value that many different cultural groups share, especially when it comes to their children."

That was important both for getting people involved and for them having a meaningful experience – that they learned and continue to learn. NYSCI also places value on the outdoors. This is especially important for adults who have just come to the U.S. from places where they had previously been outdoors more often, getting to do something outside was important. People in the area value Flushing Meadows Corona Park as a resource, so getting out into the park was important. Another priority was family, getting to do something together as a family.

ADVICE TO OTHERS

Michaela said they sort of fell into citizen science programming for such a wide range of ages – they aren't experts, and they weren't planning with much of this in mind. It took flexibility to be successful.

"You want to create a project where participants take ownership of it, and take it in their own direction. So no matter what your audience is, it's important to design a project that's responsive to the participants – that's especially true when you're dealing with diverse groups. It's also important to know that it takes work. You have to get a little creative if you want people to come who don't often participate in these kinds of things."

To be responsive, they changed activities, they changed the room, they offered activities based on what they were hearing from the participants on the social networking sites… they listened to what people were interested in, what they were asking questions about. The program took some tending, even after the structure was in place. She noted that they have so much more to learn, that there are things that they would do differently, but that the benefits outweigh the challenges.

EVALUATION

An evaluation would have been good. Who's coming? Who's missing? They know people were learning something, that they were engaged and excited, but they don't know what they were learning or who was learning what.

NOSOTROS RADIO (CUBS)

Organization Name: Nosotros Radio / L.A.C.E. - Latino students, Advancement, Commitment, and Excellence (http://www.nosotrosradio.org/)

Project Name: Celebrate Urban Birds (http://celebrateurbanbirds.org/)

Interviewee: Fanny Villarreal, Founder, Nosotros Radio and L.A.C.E.

Promising Practices Highlighted in this Case Study:

- Provide concrete benefits for participants
- Build on what's familiar
- Develop collaborative partnerships
- Be flexible and adaptive
- Offer genuine, equitable, and sustained personal contact with the community
- Uncover and address additional context-specific barriers

CONTEXT

An international PPSR project was adapted and implemented at a local level through a partnership with the leader of a community organization serving urban Latino youth.

Celebrate Urban Birds (CUBS) piloted a youth development program in 2012 at three locations in New York state. The city of Syracuse was one of those locations. The Cornell Cooperative Extension office in Syracuse provided some administrative support. The extension agent there decided to advertise the program on a local Spanish language radio program (Nosotros Radio Inc.) where he was welcomed by program founder Fanny Villarreal, a local resident and community worker. Fanny initially had little interest in CUBS. But once she started to learn about the birds, the idea of learning more about what's going on around you in your own neighborhood really interested her along with the fact that the project would demonstrate that science research and college goals were within reach for local youth. As she stated during the interview, "I bet they would never have had the opportunity to participate in a program like this, and then the connection with the University was incredible."

Fanny agreed to incorporate the pilot project into a larger youth development program she was leading and which was already underway, Latino students, Advancement, Commitment, and Excellence (L.A.C.E.). Fanny created the program with the goal of providing further education and job training for Latino youth to address the low Latino graduation rate in the city. L.A.C.E. focuses on providing Latino youth in Syracuse with experiences that promote job readiness, community stewardship, financial security, public speaking, grant writing, and much more. One of the components of that summer's program was a community improvement project to help people in their neighborhood, attract wildlife, and promote the arts.

The fifteen Latino youth participants Fanny gathered for the program wrote a successful proposal to the Cornell Lab of Ornithology to receive funds, training, and support to create a neighborhood project focused on improving habitat (for wildlife and people), promoting the arts and the value of the outdoors, and better understanding careers in science. To fit the timeline of the L.A.C.E. program, this group had only 6 weeks (meeting one day per week) to complete the project which was primarily a greening project with education about birds and their habitats and some bird observation. The students chose to create a bird garden in a local art park. They built benches, created a bird garden, painted a mural, and put up bird feeders. Creating the garden was not an easy task given that the park sits on an abandoned train yard and the soil needed a lot of work.

Along with the funds she received through CUBS, Fanny also succeeded in acquiring funds from CNY Works (http://www.cnyworks.com) and the Gifford Foundation (http://www.giffordfoundation.org) to pay youth for their participation in the program as they otherwise would have had to be employed in summer jobs. She then went to a local high school and spoke with the school psychologist who was interested in the youth program and helped Fanny identify and recruit a few troubled kids at the school. One of these youths then brought in more friends as additional participants. The final group consisted of fifteen at-risk Latino high school-aged kids, at least one of which was working toward a G.E.D. Most of the kids were recent immigrants from Cuba, Dominican Republic, and Puerto Rico who were more comfortable speaking in Spanish.

"I talked to them, made jokes, listened. I was flexible. I let them talk. Sometimes we had no time to talk about what I wanted to talk about—but that was ok. I gave them control. I asked them 'what do YOU want to do?' They began to believe in me and trust me. I had to go to some of their homes, to get to know their parents and to get authorization to involve their kids in the program. In some cases, the parents were very busy and disengaged from the lives of their kids. They seemed thankful that someone was going to look after them." However, when it came to explaining CUBS, neither Fanny nor the extension agent could articulate the project very well to the youth group. The group was not able to wrap their heads around it until CUBS administrators Karen Purcell and Marta del Campo visited the group, explained the program (speaking to the group in Spanish), and demonstrated their passion for it.

The group traveled to the Cornell Lab of Ornithology to showcase their project and where they connected with scientists, got a tour of the Cornell campus, went on hikes in a nearby wooded sanctuary, visited the Museum of Vertebrates, banded birds with Lab scientists, and learned about careers in science and conservation work in Latin America with a senior Latino scientist.

L.A.C.E. youth also traveled to the NY State Fair to showcase their project to the public through a poster they had developed and interactive activities (e.g. planting sunflower seeds in a small pot which visitors to their booth could take home) to teach about habitat restoration and birds.

According to Fanny, they all benefitted. The kids had never gone to the state fair. They had never visited a university. They had never connected with birds. Transforming the park space became a great source of pride. The kids wanted to add their signatures to the park benches they constructed there so that everyone would know it was them that created the park. "It was incredible!" The main impact was in developing the kids' self-confidence which, for some of the kids at least, was matched with increased interest in pursuing science-related education and careers (e.g. nursing, medicine, veterinary school). Their interest in learning more about birds was clearly evident in the amount of curiosity and number of questions they asked during their Cornell visit.

When asked what additional resources could have made the project run more smoothly, Fanny listed computers and more money. They had to use computers at the local library as they had none. The kids had no email which made it difficult to communicate and coordinate. Additional funding could be used to pay for food for the kids and for their transportation needs.

Finally, data collection was initially boring for the kids because there were NO birds. Then they put out the feeders and the birds started to come and it was more interesting.

WILDLIFE CONSERVATION SOCIETY (FROGWATCH USA)

Organization Name: Wildlife Conservation Society (http://www.wcs.org)

Project Name: FrogWatch USA (http://www.aza.org/frogwatch/)

Interviewee: Nalini Mohan, Global Education and Outreach Program Manager, Wildlife Conservation Society

Promising Practices Highlighted in this Case Study:

● Offer genuine, equitable, and sustained personal contact with the community

● Uncover and address additional context-specific barriers

CONTEXT

FrogWatch USA is a national program run by the Association of Zoos and Aquariums (AZA). The goal of the project is for participants to collect information on frog distribution and abundance by listening for the calls of frogs at specific locations during the spring and summer. The Wildlife Conservation Society (WCS) initiated its own FrogWatch USA program in 2011 for staff and expanded that program in 2012 to include participants in the local area around New York City, with a particular emphasis on teens. The project provides data on frogs that feed into a national database that helps establish conservation priorities for this vulnerable group. Participants are given two training sessions that teach them how to identify the frog species in the local area by call and how to collect data on the frogs. The participants then pick a location to conduct their surveys with the assistance of the coordinator, register the site with FrogWatch USA, and visit that site repeatedly over the breeding season (February to August) to collect data. They email their data to AZA for analysis.

There's a big emphasis on frog diversity in the materials from AZA about the FrogWatch USA project (and how important that diversity is) but nothing about human diversity. Nalini saw that as a disconnect and it piqued her interest — she saw this as an opportunity to involve her own community in the work. This was the first year that Nalini had tried to expand the FrogWatch project outside the gates of the Zoo and her focus was getting youths in her community involved in the project. For WCS, this project would help expand their reach in the local area, involving people in local conservation efforts in and around the Bronx, where the population consists largely of underrepresented audiences. This project was an opportunity to build bridges to the community, create more awareness of the environment in the community, and create a greater understanding and appreciation of science. For the participants, it was an opportunity to be involved in hands-on science. Participants gain a great understanding and appreciation for their local wetlands. Nalini focused on three groups drawn from the local community: a Boy Scout group, a Girl Scout group, and a nature group of youth and parents. She saw benefit in encouraging girls in the project and was pleased to train both boys and girls.

There are actually significant barriers to participation in the New York City area because of the urban nature of the environment. The data protocols call for data to be collected at night in a wetland location, which presents a

number of problems for an urban youth audience. Most don't have cars which makes it difficult to get to outlying locations where the frogs might be located. There may be significant challenges getting permission or access to the sites where people want to monitor. There's also a safety issue – whether actual or perceived – in going out to isolated wetland areas at night. Frogs are also not the 'sexiest' of organisms to study. Youth may think they're kind of cool, but that appreciation doesn't overcome some of these other barriers. There is also a lack of awareness of the program in the New York City area and getting attention and generating interest in it has proven difficult.

Some of the youth groups that Nalini worked with had such busy schedules and variety of choices for their free time that they had a hard time following through on selecting a location and collecting data after the initial training. She worked with a Girl Scout group that, despite living in an area with good frog habitat (they could hear frogs from the living room where the training took place!), they didn't go beyond the training, despite numerous attempts to encourage them and offers to help them onsite. Nalini tried to be extremely proactive, contacting the groups regularly and offering to go with them into the field whenever they wanted, to try to address the concerns and get the groups over the hump of reluctance to actually visit sites at night.

Demonstrations and on-site assistance seem to be important. This is not the type of project where participants (particularly youth, in this case) can receive the training and then be turned loose to collect the data.

Understanding the audience is key and it would've been great to have resources that would help that – both at the local level and the larger scale. What would be really useful are resources for enhancing EDI (equity, diversity, and inclusion) in citizen science projects, strategies for inclusion. It's important to have educational materials geared toward different audiences (including exercises for younger participants to do that are fun and engaging).

Since there are many languages spoken here (Spanish only being the most prominent among a variety of languages), it would be really useful to have materials in other languages. Finally, Nalini would like to see more sharing of stories. It would be great to have a repository of success stories with regard to EDI in citizen science.

ENVIRONMENT FOR THE AMERICAS (CONNECTING CULTURES STUDY)

Organization Name: Environment for the Americas (http://www.birdday.org/)

Project Name: Connecting Cultures Study: A Project to Engage Latinos in Science Education
(http://www.birdday.org/connectingcultures/connecting-cultures-study)

Interviewee: Natasha Kerr, Diversity Outreach Coordinator, Environment for the Americas

Promising Practices Highlighted in this Case Study:

Build on what's familiar

Develop collaborative partnerships

Offer genuine, equitable, and sustained personal contact with the community

Uncover and address additional context-specific barriers

CONTEXT

This is a science engagement and capacity building research program to broaden Latino participation in informal science. The Latino population is the fastest growing ethnic group in the United States, but the least likely to visit National Parks and natural areas. In May 2009, Environment for the Americas received a grant from the National Science Foundation to study the barriers to participation in nature and science programs and to develop tools that organizations may use to better reach this audience.

The four year research study involved six study sites, five sites were National Parks and one was a state park. There were also three control sites. The sites were selected because of the significant Latino populations residing in communities near park sites.

In the first year they conducted a community survey of 1000 adult Latinos near these sites. The survey asked about their interest in nature and science programing, language preferences, educational background, demographics, costs, transportation, and comfort level. In the second, third, and fourth year of the study, they engaged local Latino communities to visit these parks. Twelve interns were trained to go out and engage the communities.

PROJECT GOALS

- Identify and reduce barriers to Latino participation in informal science education;

- Provide effective tools to assist educators in connecting Latino families with science education;

- Broadly disseminate these tools to agencies and organizations challenged to engage this audience in informal science education.

Project Results

Outreach Toolkit (http://www.birdday.org/connectingcultures/outreach-tools): Based on our research findings and Latino outreach experience, EFTA created an Outreach Toolkit with suggestions and ideas on how nature-based sites can improve their capacity to reach this audience.

Diversity Engagement Resources (http://www.birdday.org/connectingcultures/resources): Find educational materials, multilingual activities, journal articles, and web links that will build your knowledge and capacity to engage Latino communities.

Research Findings: The data finding from the study will be posted in Spring 2013.

Build on what's familiar

One of our outreach strategies was to participate in community events with large numbers of Latino participants. These events were often unrelated to natural history such as health fairs or cultural celebrations. However, these community events offered us valuable opportunities to engage with our targeted audience. We made a presence in the community by hosting interactive educational booths at public events and we shared information about IMBD events, how to get to the park site, and information on bird conservation. EFTA interns personally invited people to IMBD events and gathered contact information to remind people about the upcoming IMBD event.

Flyers to schools really worked when sent through proper channels and approved by the schools.

Language can be a barrier, but it depends on the community, so be ready to provide bilingual information and materials. In some cases it was necessary to create new material specifically for Latino audiences. First find out if language is a barrier. If it is, offer a Spanish language nature or bird walk. It can also be very beneficial to reach out to bilingual media.

Develop collaborative partnerships

Interns were invaluable to the project. They created engaging educational activities that connected with their audiences' background and interests. Interns also built relationships with community members, educators, and leaders and extended personal invitations to attend educational programs hosted at nearby parks.

Libraries were the most cooperative partners. Many already had bilingual programs.

Partnering with community organizations already serving Latino audiences, like the Boys and Girls Clubs, YMCA, and faith-based organizations was effective because they often had transportation and could help with field trips.

After meeting and developing a relationship with a community leader or organization, they often will introduce you to other community contacts and even invite you to other events.

Start your planning months in advance. Contact libraries, schools, community groups, and organizations three or more months ahead of time to get on their schedule and collaborate with them on a nature event.

OFFER GENUINE, EQUITABLE, AND SUSTAINED PERSONAL CONTACT WITH THE COMMUNITY

Conducting face to face meetings with community leaders and community organizations helped to build relationships.

UNCOVER AND ADDRESS ADDITIONAL CONTEXT-SPECIFIC BARRIERS

The number one barrier for Latino groups in this study was lack of awareness of a park site near them. For example, only 8% of respondents knew Muir Woods Park even existed. Realize that new park visitors need very clear information on "how to get there" and what to expect during an educational program taking place outdoors. Marketing materials should have directions/map, transportation options to get to the park, and other pertinent parking information. Include details on what gear and provisions are needed.

Transportation was an issue at a few sites where parks were further away from the city. Sites with newer immigrants may have transportation issues. To address transportation issues, organize with a faith based- or community group that can provide transportation or organize a car pool. Often people are more willing to do new things with their community or faith based group.