12+ Lessons From a Community Science Project

Engaging community to protect the Pinole Creek Watershed: Assessment of trash impacts to promote a thriving ecosystem

Pinole, CA
June 2022

Lisa Anich, Win Cowger, Itzel Gomez, Todd Harwell, Norma Martínez-Rubin, Ann Moriarty

Acknowledgements

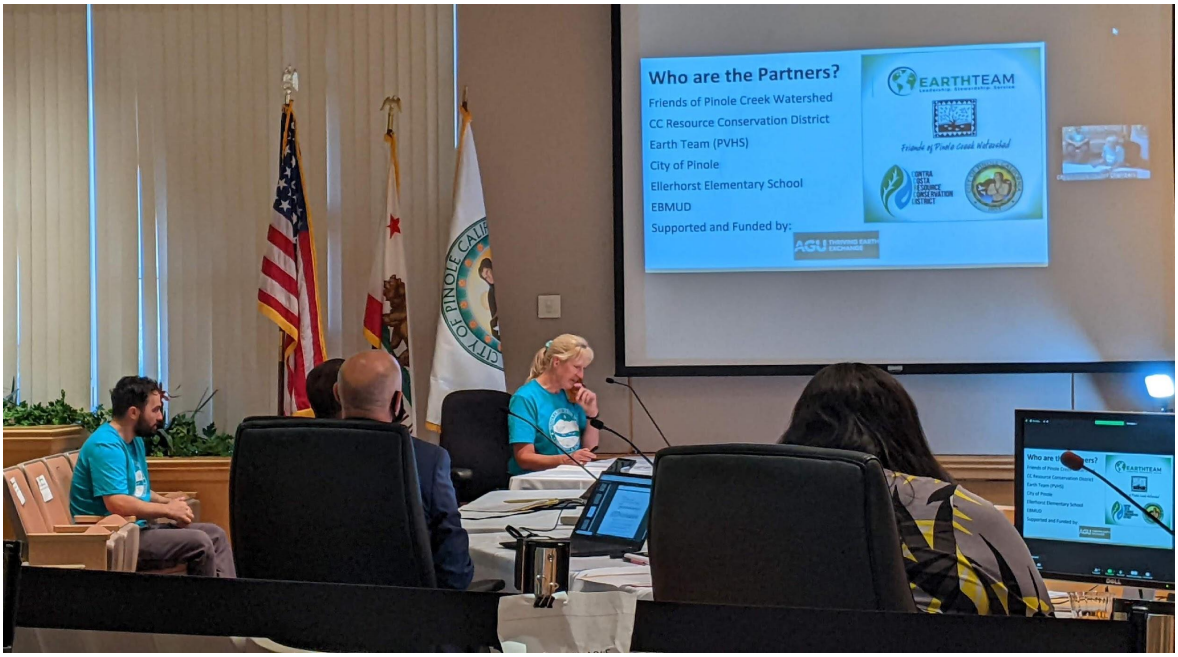
We would like to acknowledge the Ohlone people, who are the traditional custodians of this land. We pay our respects to the Ohlone elders, past, present, and future, who call this place, Ohlone Land, the land that Pinole sits upon, their home. We are proud to continue their tradition of coming together and growing as a community.

This project was made possible because of the collaborative relationships among the leadership team members whose affiliations with voluntary, nonprofit, private, and local government organizations enabled a coming together of necessary perspectives to implement it. The project's leadership team included Lisa Anich, Win Cowger, Itzel Gomez, Todd Harwell, Norma Martínez-Rubin, and Ann Moriarty.

The project was part of the American Geophysical Union/Thriving Earth Exchange science, policy, and engagement cohort sponsored by the Gordon and Betty Moore Foundation. The Moore Institute for Plastic Pollution Research, The McPike Zima Charitable Foundation, and University of California, Riverside funded Win Cowger to participate in this project.

"As scientists we often find ourselves leading conversations and making decisions, but that doesn't work for community centered science; I learned to decenter my voice and to ask the community to make decisions when they weren't purely scientific questions."

-Win Cowger, Ph.D., Project Scientist



Above: Win Cowger and Ann Moriarty presenting community science project findings at a Pinole City Council meeting. Below: Youth from Earth Team and other community members and project supporters gather prior to making public comments at the city council meeting.

Image source: Pinole Community Science Project files

What We Set Out to Do

In the fall of 2019, over coffee at a local shop, a few of us met to discuss how we might work together and address an ongoing set of problems: trash in the Pinole Creek, litter along creek trails, and unorganized local action to effect long-term, sustainable protection of a precious ecosystem — The Pinole Creek Watershed. This report is a short story by the project leadership team, the Group who saw it worthwhile to meet, think aloud, brainstorm, bounce around ideas, and believe in the possibility of bringing something new and helpful to Pinole.

With some help and a timeline …

(January 2021 – June 30, 2022)

The American Geophysical Union Thriving Earth Exchange (AGU TEX) functioned as the backbone organization for the first community science project of its kind in Pinole, CA. With an environmental problem that at times feels insurmountable, it helped us locals to join an international community. We could count ourselves among individuals who believe in the power of volunteerism, opportunities for personal and professional growth, and co-creation of community-driven solutions. We planned and implemented a project with community engagement at its core and a scientific approach to document our identified problem. To succeed, we invited input toward solutions and delved into policy development. We tried it, we fumbled, and we kept going with assistance by our Project Manager, Todd Harwell and Win Cowger, our Community Scientist, both matched by AGU TEX to fit our technical needs, support our processes, and guide the "science."

Time together as a leadership team tested our adaptability to each other's communication styles. They ranged from relying on detailed lists to exchanging philosophical quips on local governance. Through it, we experienced what "leadership" entails: listening, innovating, daring, following through, adapting, introducing. We provided each other encouragement and tips, news of community events at which to recruit volunteers and expand our reach, and feedback on steps taken. We shared our individual skills as nature enthusiasts, educators, volunteer organizers, youth mentors, and civic leaders. Nearing our project term's end, we can report on the results of our synergy and a few lessons learned. Among this, our collegiality led to proposed solutions heard beyond our team meetings. Our work culminated in presentations to local groups of conservationists, parents and teachers, youth, and civic leaders. We trust the work won't end. How can it? We've shared and fostered a spirit of environmental stewardship and sparked civic involvement — two essential elements to sustain a thriving ecosystem.

I'm grateful to Ann, Itzel, Lisa, Todd, and Win for working alongside and bringing our project to fruition.

Norma Martínez-Rubin, Pinole, CA

WHAT WE FOUND EASY

Lisa: The smoothest sailing occurred at the start of the project, and again as the project neared completion. AGU's application process was well structured. As project fellow, Todd gave us a strong start by providing helpful perspectives from other Thriving Earth Exchange projects and guiding us towards setting a realistic schedule. Todd's coordination continued to support us throughout the project. Refining goals and planning implementation required a lot of time and effort in the middle of the project, but the investment paid off.

Win: My role in collecting the data was easy because the community took charge and brought on the effort to make it happen with very little effort on my part. Getting reimbursed for costs was easy for me because it was all handled through AGU's vendor system which I was already in. Spending time in meetings was fun because this community collective is a great group of inspiring people to work with. Conveying science to the group was easy because this group was already highly educated in science and was asking me critical scientific questions from the start. This team is active and takes initiative to get things done, I didn't feel like I was a lone wolf at any moment in this project. Data aggregation and cleaning was easy because the group created a tidy dataset that was simple for me to understand. Using a standardized methodology made it simple to justify why we chose the method we did "it's validated" you couldn't say that 3 years ago in trash research because there were not validated methods, just a random assortment of methods and theories about how well they worked.

Todd: Collaborating with the core team of project leaders along with our project scientist was an incredibly positive experience. There was an overall sense of mutual respect and camaraderie among the team that allowed us to communicate openly with one another even in times of misunderstanding or disagreement. Having taken the time at the outset of a project to identify and refine our goals, objectives, and intended outcomes really helped keep us on track for the duration of the project.

Norma: We found it easy to work with Todd, our assigned Project Manager whom we relied on to keep us on task per the goals we outlined in our project proposal. As we delved into discussions about how we would meet those goals, varied work preferences and leadership styles surfaced. Todd's calm demeanor helped keep us from not losing sight of what we needed to accomplish, including the successful recruitment of our project scientist, Win. Win's lighthearted and generous spirit won us over. His patience explaining the relevance of following a data-collection protocol to inform policy made way for the leadership's team adoption and eventual adaptation for its use in Pinole.

Ann: Personally, I enjoy preparing and making presentations, so that was good. Being an extrovert, interacting with volunteers and the public is something that gives me energy. I love Pinole Creek, so making the decision to pursue a project that might make the creek better for all inhabitants, including humans, was a no-brainer. Being part of a team made this project easier; we could rely on each other to complete tasks and do the things we couldn't do ourselves. That teamwork and trust is extremely important.

Having financial resources provided by the grants made it much easier to complete the project. We were able to purchase equipment such as waders and buckets and pay for travel expenses for our project scientist. His physical presence here was important.

WHAT WE FOUND DIFFICULT

A.K.A. "BUILDING THE [METAPHORICAL] AIRPLANE WHILE … FLYING IT."

… and we know ducks can fly …

Present-day fowl inhabitants of the Pinole Creek.
Photo Credit: Norma Martínez-Rubin

Lisa: The team's greatest challenge was to narrow down our proposal's broad goals to implement specific actions. After Win joined the team as advising scientist, we were able to select key questions, set aside others, and focus on the assessment protocol. Ground-truthing assessment sites for property access and volunteer safety, and ongoing conversations about available resources for field work, led to a successful trash assessment plan.

Win: Part of the project overlapped with completing my dissertation for my PhD. I had to ask the group if I could drop out for a few months. They graciously allowed it. We spent ~40-80 hours developing and deciding on what we would study and at times seeming like we went in circles, but I realized at the end that it was all part of the process of having community centered science and the outcome was well worth the effort and the wait. When we presented to diverse audiences with a variety of backgrounds and education, it was challenging to strike the balance between over explaining things and making sure concepts were clear, but I think we did a pretty good job for the most part.

Itzel: The most challenging part of this project was figuring out the methodology and then executing it. We spent over 6 months brainstorming our goals and objectives. We sat in long conversations discussing what each of us envisioned as the end goal. It was challenging to try and meld everyone's ideas into one unified and cohesive vision. Once we had agreed on a handful of goals and objectives, it came time to start discussing how we would collect data for the project. Our partner scientist, Win Cowger introduced the protocols. At first glance they seemed straightforward! However, we soon realized that we were going to have to figure out a way for those protocols to fit our specific needs and do so keeping in mind the safety of volunteers.

Originally, we mapped out more than 40 random sites where we were to complete litter assessments. They stretched across several tributaries and far reaches of the watershed that were at times completely inaccessible. Some sites were so overgrown with poison oak, blackberry bushes, and English ivy that it made it too treacherous to reach the creek. Other sites were behind residential homes or on private property which introduced another problem of having to get homeowner permission to access those areas. A little disheartened, we came to accept the logistical nightmare it would be to complete assessments at each of those sites in our 4-month goal. So, we re-evaluated our vision, expressed our concerns to Dr. Cowger, and came up with a new list of sites. These sites would only be on the main stem of the creek. With a better understanding of the protocols, we learned there was some flexibility in moving the assessment location. To best fit our needs for safety and accessibility we could move the starting point either 300 feet upstream or downstream. This was very helpful as we were able to adjust if an area was too overgrown or if the banks were too steep to climb down to access the creek.

After that we spent more weeks planning, preparing, and trying to get every detail just right before we brought in volunteers. At some point all we needed to do was jump in and get started with our first data collection event. We continued to learn along the way. We granted ourselves more empathy and moved forward with the understanding that sometimes plans change and that's okay.

Todd: From my perspective as the Community Science Fellow and someone who is not a member of this community, it was difficult to fully understand community dynamics in terms of who was or was not interested in what we were working to accomplish. While I was able to develop wonderful relationships with the community leaders and the project scientist, I still felt a somewhat lack of connection to the broader community, which was challenging when trying to strategize about the bigger picture of engaging other community members, organizations, and a number of stakeholders throughout this process and beyond.

Norma: Care of the Pinole Creek is central to Friends of Pinole Creek Watershed. Our community science project afforded an opportunity to involve more than the usual persons who ordinarily support environmental education and related activities. However, like many

volunteer-led organizations, team leader availability to spur broad participation competed with other obligations. We stumbled a bit as to how many people could be safely involved in field work and kept in mind the need to make the volunteer experience worthwhile. At the end we did relatively well and realized the significance of this work extends beyond data collection.

Ann: This project was a LOT of work and required a commitment to spending the time needed to make sure we were prepared. Being retired, I was able to prioritize this project, but I don't imagine everyone would be able to do so. That said, perhaps what was more difficult was facing COVID restrictions and making sure we had the correct permitting and knowledge in order before getting into the creek. Not being able to pull out some of the larger trash items in the creek was a challenge as we did not want anything to remain. Personally, I struggled not being able to count trash that was outside the boundaries of the project protocol. On the leadership team, we worked hard to communicate but weren't always on the same page. We had to work through conflict and that took trust and dedication.

Successes/things that kept us going…

Lisa: The opportunity to innovate was motivational. There are many excellent initiatives to reduce trash in Contra Costa County, however this project is unique in its structured combination of community science and engagement resulting in community-identified actions that can be implemented as public policy. Win was an excellent fit for the project. As scientific advisor, he combined expertise with a passion for innovative solutions.

The core team of adult volunteers who conducted the trash assessments also contributed much to our success. Though newly acquainted, these volunteers readily formed teams and their camaraderie gave our project a huge boost.

Win: We ended up getting our policy recommendations moved forward in the city council policy making process; that was a huge win for me. We educated and inspired students through the Earth Team and, in turn, they inspired me with their reflections and determination at the City Council meeting and other meetings [held prior] with the community. We are creating final reports that look professional and may even be published in peer reviewed literature!

Itzel: Getting youth involved was an important outcome of this project. I thought it was going to take a lot more convincing to get high school students excited about litter assessments, but after the first cleanup we did as a group they began to look forward to spending time by the creek. During each assessment we split up the protocols by tasks to give each student a role. Some were in charge of recording metadata, others in charge of the before and after photos, and the adventurous ones were asked to wear waders and walk through the creek channel searching for trash in the waterway. Walking in the creek offered a new perspective of the watershed. Students saw animals that live in or near the creek including snowy egrets, dragonflies, and various spiders. Eventually they began to recognize common plants that grow on the creek banks and spent afternoons sketching the creek in their nature journals. When Earth Team interns hosted a litter cleanup with the Ellerhorst Elementary School students, they

expressed how rewarding it was to lead younger students and share the importance of keeping the creek clean. One intern reflected, "Through the experience leading elementary students cleaning up around Ellerhorst, I learned about the importance of educating young children about the environment. It was enjoyable to meet new children and to see how much they were enjoying the cleanup." Earth Team interns spoke up at the City Council presentation and it was clear to everyone there how much of a connection they had built with the creek and how passionate they are about keeping it clean. [The following testimonials exemplify the amplitude of how community science influences youth.]

"I joined Earth Team because as a resident of Pinole, trash in the city would always catch my attention. I would see it near stores, schools, and gas stations. I was especially interested in the nature of Pinole, seeing litter in those areas was always very off putting. I wondered who had the responsibility of cleaning this trash up and what they got out of it. When I saw Earth Team this year I finally found out who those people were, and I wanted to take on the responsibility as well. I wanted to participate in the cleaning and beautification of Pinole to improve the life of other residents and the wildlife here that could be affected. Since I've joined I came to realize what people get out of working in Earth Team. I got an amazing learning experience with so many opportunities opened up to me. Earth Team also helped me to open up to new people when I worked with my teammates to clean the Pinole Creek, plant in the native plant garden, and perform soil and water testing. One of my favorite experiences on Earth Team was going to Ellerhorst Elementary and guiding students to clean trash up around their school. It was a completely new experience that helped me learn about my teammates and myself as a leader."

-Natalie Szumlas, PVHS Earth Team Intern

"…. Being an Earth Team intern allowed me to explore the part of the Pinole area that many people don't seem to notice, which is the Pinole Creek. Before this internship, I had no idea that the creek ran next to my school, outside Sprouts, near Collins Elementary, and other places in the city that I pass by every single day. My experiences being around the creek taught me something, which is that many people who litter don't seem to think about the consequences of their actions. In the case of OUR creek and community, I believe that many people in Pinole are littering because they're unaware of the local effects that it has on the Pinole Creek and [on] our community as a whole. Because of this, I'd like to say that more things should be done to increase the visibility of the creek and as the Pinole City Council, I think that it's something that should definitely be considered.

-Derek Manahan, PVHS Earth Team Intern

Todd: Seeing community science in action! And seeing it done in an authentic way that is 100% community-initiated and community-driven. As a scholar of STEM engagement with a focus on citizen and community science, I see the term "community science" attributed to a variety of different projects and programs, many of which involve little to no element of community-level

engagement or impact. The opportunity to support this passionate team of leaders from Pinole and see them empowered and confident to drive these efforts with and for their fellow community members has been incredibly rewarding. The whole project and process is a prime example to of how community science should be done.

Norma: The possibility of expanding interest in keeping the Pinole Creek pristine and inviting more than the established groups who've encouraged and supported that was greatly motivating. Too often I see the same adults involved in civic affairs and know it takes early and ongoing positive involvement in a community effort to develop a lifelong sense of caring for one's environment. To have Earth Team members as key contributors to this project was spot on as we mutually enjoyed their youthful participation, connected with each other digitally and in person, and, with devoted attention to required permitting processes and the data-collection protocol, worked together and safely enjoyed the outdoors, too!

Ann: I don't think any results or successes were unexpected from my end. I found learning new methods and remaining committed to them profoundly impactful. Engaging new people was fabulous and I consider that I now have many new friends. Though our adult volunteer cadre was not as [ethnically] diverse as I would have hoped, we still had a diversity of age and gender. Earth Team brought more racial diversity to the table. Watching the Earth Team interns grow and take risks in speaking to their fellow students and then to the City Council meant a LOT. The two interactive community meetings held via Zoom (due to COVID restrictions) were phenomenally successful, engaging all participants in meaningful ways.

Would we do it again?

lessons Learned that we'll pass onto others embarking on a community science project because why learn the hard way?

1. Do something you are passionate about!
2. Make project leadership team meeting times consistent and ongoing for checking in, updating, planning, retracing steps. Such meetings can morph from free-flow discussion to following an agenda that ensures key items are mentioned, discussed, and heard by all and attended to between meetings for gradual and ongoing project progress.
3. Include a dose of fun and humor for treading through new and awkward experiences, missteps, unanticipated interpersonal offenses. Leadership and communication styles vary. Keeping in mind a larger goal for working together to address a problem of common interest has got to be paramount.
4. Expect twists and turns. Our use of online platforms for project participant input substituted the in-person field approach used pre-COVID. Use of online platforms and digital whiteboards (Zoom, Jamboard, Padlet) allowed for virtual notetaking; this supported individual and group participation while mitigating COVID infections. Resultant

interactivity, brainstorming, and digital collection of action and policy development ideas allowed for content creation for presentations (listed below) to audiences elsewhere.

5. Step up and be willing to work hard at tasks you might not be good at. Being humble and willing to make mistakes and learn from them is part of the risk we each must take.

6. Listen to each other on the project team and to others in the community. It is crucial. Responding and being flexible makes a difference. Community Science is a great model; having a project scientist was critical to establishing the importance of data and how we could use data to drive policy and behavioral recommendations.

7. Trust your colleagues and be flexible, be willing to change course if another idea is better. But also, be willing to stand up for what you think is important. Respectful dialogue and interchange lead to a better project.

8. Allow people to show up in whatever capacity they can. More people care about the issue than you think, and they'll show up differently for it. It's sometimes daunting thinking about the challenge we're facing—keeping Pinole Creek clean. At times it feels overwhelmingly lonely. You see the same handful of volunteers show up time and time again and you begin to wonder if anyone else cares outside of this little bubble you're building. People do care, but they show up in different ways. Some will be there at every event to roll up their sleeves and haul out pounds of trash from the creek, some will never show up to cleanup events, but that won't stop them from picking up trash on their morning walk or afternoon bike ride, some will use their voice and speak up at council meetings or share photos on social media, and many will fervently cheer you on.

9. Hold space for the community to address their concerns, share ideas, celebrate victories, and spend time in nature together. Invite all your project leads, volunteers, scientists, and fellows to gather outside of the usual data collection events.

10. Encourage folks to learn each other's names and share stories. This will build a sense of trust and belonging. Show people that younger generations care and older generations have many lessons to share.

11. Utilize the AGU staff's knowledge, expertise, and connections. When we were having trouble understanding how to communicate our project goals we worked with AGU's Communications Lead, and she held one on one workshops with our team. These were valuable and gave us an opportunity to ask questions that were specific to our project.

12. Recognize that a project goal may evolve as the leadership team works with a science expert and engages the community. Anticipate that broad or ambitious goals may need more focus. Through discussion, our team converged on key guiding questions that led to a successful project.

13. Seek project development opportunities. Progress occurs both within leadership team meetings and outside of those meetings. Throughout the project, Norma participated in AGU's program-wide leadership meetings. Itzel, Ann, and I met with AGU's

communications expert. These supporting conversations provided perspective and gave us more confidence in our decisions.

14. Engage for long-term effects. While it's great to recruit a crowd of volunteers for a clean-up or fill a room for a public hearing, it's even better to have the ongoing involvement of volunteers and to hear authentic public comments. That is what gives durability to a long-term initiative challenging the trash status-quo. Both Ann and Norma brought energetic devotion to their community to this project, and the leadership and advocacy of the Earth Team interns reflects Itzel's skill and vision.

15. Practice patience. It takes a long time to build a community centered scientific study with a ton of discussion back and forth, but it is well worth the wait! As scientists we often want to control every aspect of how the data is collected but that doesn't work when [the]community wants to be the one collecting the data. I learned to pay more attention to big picture red flags than minute details of the field methods.

Who we reached Within and beyond Pinole

The following lists presentations conducted through the project term by presenter(s), date, presentation title, and audience.

Anich, L., Cowger, W., Gomez, I., Harwell, T., Martínez-Rubin, N., Moriarty. (2021, December) A. Engaging community to protect the Pinole Creek Watershed: Assessment of trash impacts to promote a thriving ecosystem [Abstract submitted and accepted for presentation at the Salmonid Restoration Conference, Santa Cruz, CA.

Anich, L., Cowger, W., Gomez, I., Harwell, T., Martínez-Rubin, N., Moriarty. (2022, January). Trash assessment project initial results and discussion.

Anich, L., Cowger, W., Gomez, I., Harwell, T., Martínez-Rubin, N., Moriarty. (2022, February). Trash assessment project results and discussion. Friends of Pinole Creek Watershed General Meeting.

Anich, L., Gomez, I., Martínez-Rubin, N., Moriarty, A. (2021, March). Engaging community to protect the Pinole Creek Watershed: Assessment of trash impacts to promote a thriving ecosystem. Presentation to Contra Costa Resource Conservation District.

Cowger, W. (2021, December). Engaging community to protect the Pinole Creek Watershed: Assessment of trash impacts to promote a thriving ecosystem. Presentation to the American Geological Union.

Cowger, W. (2022, April). Working with community groups in the Thriving Earth Exchange to assess management strategies and assess water quality. Presentation to the International Association for Landscape Ecology Riverside, CA.

Martínez-Rubin, N. & Moriarty, A. (2021, April). About creeks, trash, & community science. Presentation to West Contra Costa Mayors Conference.

Moriarty, A. & Cowger, W. (2021, October). Engaging community to protect the Pinole Creek Watershed: Assessment of trash impacts to promote a thriving ecosystem. Presentation to the Pinole City Council.

Moriarty, A. & Cowger, W. (2022, April). Engaging community to protect the Pinole Creek Watershed: Assessment of trash impacts to promote a thriving ecosystem. Presentation to the Pinole City Council. Pinole, CA.

Moriarty, A. & Moffet, M. (2022, April). Engaging community to protect the Pinole Creek Watershed: Assessment of trash impacts to promote a thriving ecosystem. Presentation at the Pinole Community Services Commission. Salmonid Restoration Conference. Santa Cruz, CA.

Moriarty, A. (2021, July). Engaging community to protect the Pinole Creek Watershed: Assessment of trash impacts to promote a thriving ecosystem. Presentation to the Pinole Community Services Commission.

Moriarty, A. (2021, June). Engaging community to protect the Pinole Creek Watershed: Assessment of trash impacts to promote a thriving ecosystem. Presentation to the Pinole Community Services Commission.

What's next?

Foreseeable activities and/or actions for this leadership team or related groups to undertake as an extension of the project term:

- Spend grant funds as permitted on project-related expenses
- Reach out to other community groups (e.g., Pinole Rotary Club) to coordinate monthly trash clean-ups with support of the City of Pinole
- Maintain collaborative partnerships among community-based organizations and government agencies in support of a healthy Pinole Creek Watershed
- Continue to follow up with the City of Pinole to confirm budget allocations for requested items
- Monitor policy recommendations from the project leadership team to the Pinole City Council to see if they are realized and improve the creek's health
- Undertake a follow-up study in 5 years!
- See a trash-free pinole creek one day

Pictured are youth, teachers, and adults who celebrated their involvement in Pinole's community science project with an organized hike at Briones Regional Park, in Contra Costa County, CA, from where one can see watershed lands.
Photo Credit: Ann Moriarty

"The learning aspects of a community science project are intergenerational and future environmental stewards are likely to carry on an appreciation of shared experiences."

-Norma Martínez-Rubin, Pinole, CA