# Doing Science Together

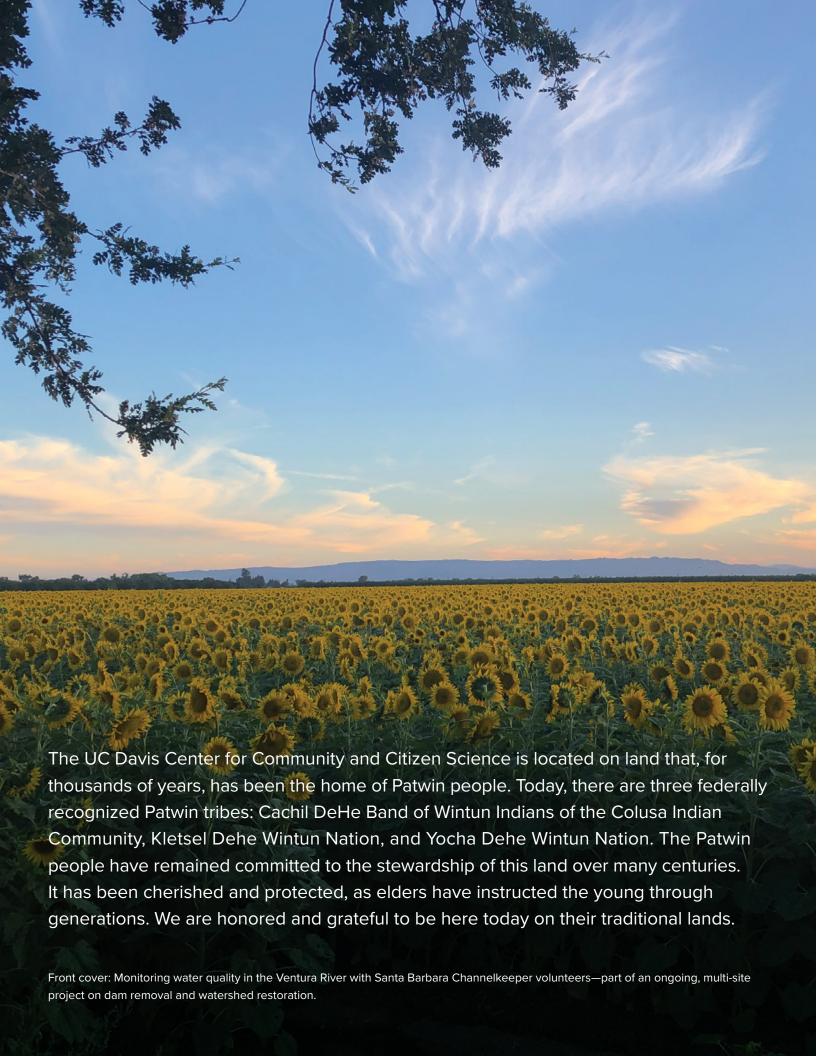
IMPACT REPORT 2024 UCDAVIS Center for Community and Citizen Science At the School of Education



## Who can do science?

The Center for Community and Citizen Science is focused on the promise and potential of science outside of typical academic and professional silos. Our mission—to help scientists, communities, and other members of the public collaborate on science to address environmental problems as a part of civic life—recognizes the inspiring possibilities that emerge when we dismantle assumptions about who can (and can't) do real science, and think creatively about what collaboration can look like.





education.ucdavis.edu/ccs

# How do we achieve deep impacts and broad reach?



Since its establishment in 2016 at the UC Davis School of Education, our Center has served as a hub for research and programming in community and citizen science (CCS). Our research is multidisciplinary, and our products and impacts are driven by the priorities of our partners. We are proud of all we've accomplished in the last eight years, and the foundation we've built to position the Center for even greater impact in the future.

## What is Community and Citizen Science?

In community and citizen science, people who do not self-identify as professional scientists actively participate in scientific research and monitoring. There are many different practices and approaches, stemming from academic traditions such as citizen science, participatory action research, and community-based participatory monitoring. We include both citizen science and community science to honor the history and distinct approaches of each.

We strive to understand the benefits of CCS for learning, communities, and environmental management through our research, while also supporting the scientists and practitioners who bring open hearts and creative spirits to the endeavor.





We believe in opening science up to participation and collaboration. Realizing that vision will take many different forms of innovation and change. Professional **SCIENCE** must become more collaborative, accessible, and responsive. **EDUCATION** must engage learners in authentic scientific experiences relating to real-world problems, from local to global. **COMMUNITIES** need resources, support, and capacity to lead the research that matters most to them. Protecting the **ENVIRONMENT** requires more diverse perspectives and knowledge sources, and built-in collaboration to grow a robust sense of shared stewardship. Permeating our work across all of these impact areas is the urgent priority of attending to **DIVERSITY**, **EQUITY**, **INCLUSION** AND **JUSTICE**.

The following pages showcase projects happening around the world, with many kinds of non-academic partners. Each project has impacts across our priority areas.

## The measure of our work

As a university-based research center focused on CCS, we work both inside and outside of academia. Even in traditional indicators of scholarly success, such as fundraising and publications, our collaborative approach shows through.

### **FUNDING**



Diverse institutional funders help us reach educators, scientists, and CCS practitioners all over the world.

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16
FUNDING SOURCES

Federal: National Oceanic and Atmospheric Administration •
National Science Foundation • US Department of Agriculture
• US Department of Education • State: CalFIRE • California
Department of Education • California Department of Fish and
Wildlife • California Natural Resources Agency • California
Ocean Protection Council / Private: Rita Allen Foundation
• S. D. Bechtel, Jr. Foundation • Gordon and Betty Moore
Foundation • North American Association for Environmental
Education • David & Lucile Packard Foundation • Resources
Legacy Fund

### WHAT DOES EQUITABLE COLLABORATION LOOK LIKE?

Walking the walk: When we write grants, we involve partners from the beginning, in ways that work for them. Joint fundraising supports our partners that have not received this level of funding before—most of whom are based outside of academia—to pursue their priorities, shape research, and build capacity for impactful CCS. This approach strengthens our research and programming, while directly benefiting environmental and education organizations.

\$3 M

SUPPORT TO OUR PARTNERS

 $(including\ community\mbox{-based\ organizations},\ museums,\ schools,\ and\ collaborating\ scientists)$ 

\$3.7 M

DIRECT SUPPORT TO OUR CENTER

### WHERE DO WE WORK?

We work in myriad

## contexts,

from urban to rural, in sites such as prisons, museums, and schools, including Title I and continuation schools, and a school for the deaf and hard of hearing. We work with governments, Tribes, community-based organizations, land trusts, and professional science organizations. We listen and learn in these contexts, and build bridges between them.

We have a strong presence in our own backyard. We regularly advise state agencies, and have had projects in more than



## 15 California counties,

along with our national-level projects.

Our projects and partnerships also extend throughout the



including collaborations in the **UK**, **Tanzania**, and **Uganda**. Faculty Director Heidi Ballard has advised government institutions and universities **throughout Europe**, including in the UK, Austria, Denmark, and Germany.

### **AUTHORSHIP**

world,

Our research on CCS is highly collaborative, and this shows in our publications. Since 2016, our



42 academic publications included

148 co-authors.

of these co-authors were from outside academia, showing how we share credit, bring collaborators into the research process, and expand the range of voices that influence advancing scientific knowledge.



## CCS in support of justice, equity, diversity, inclusion, and access

Community and citizen science has the potential to reshape the power dynamics of traditional science. A central part of our mission is to realize that potential through thoughtful design, and to push the boundaries of who can participate in, take ownership of, and benefit from science. We are grateful for the opportunity to partner with and learn from communities that have a real stake in the outcomes of environmental research, including indigenous groups, under-resourced students and schools, and incarcerated people. Such partnerships are all the more essential when we consider the historic and ongoing injustices that have marginalized these groups, and the invaluable perspectives, skills and knowledge that they bring to our collaboration.

As indicators on this page show, our impact is not just the scale of our work, but the ways in which it upholds these values in its practice and design.

"I appreciate how Tribal input was a foundation to this training and curriculum. It truly strengthens the connection to the land and the original stewards. This huge amount of influence is so unique and should be considered the baseline for future programs nation-wide."

Anonymous Clear Lake educator training participant

## More than a decade of collaboration and innovation

## 2009

> Center Faculty Director Heidi Ballard co-authors report outlining the field of Public Participation in Scientific Research and citizen science as an approach to science education.

#### 2011-15

- > Ballard helps establish the Citizen Science Association and the journal Citizen Science: Theory and Practice.
- > Ballard and colleagues lead research on Youth-focused Community and Citizen Science (YCCS) case studies around Northern California.
- > Collaborative research with COASST program examines participant motivations in long-term citizen science.
- > NSF grant establishes first of multiple collaborations with UC Environmental Stewards on role of CCS in adult learning.
- > NSF-funded collaborative research with Cornell Lab of Ornithology examines 6 different CCS projects across the U.S.

## 2018

- > Initiative begins on CCS in dam removal and watershed restoration (now in Year 6), studying and building capacity for community-based monitoring in sites around the Western US.
- > Collaboration with the UC Davis Student Farm leads to new school-based CitSci on the Farm program, connecting school campus-based CCS with University programming.
- > Partnership established with California-based Insight Garden Program, to develop citizen science in prison contexts.
- > Launched the Collabinar event series, bringing researchers and practitioners from around the world to workshop challenges and opportunities in CCS.

## 2017

- > International 5-year LEARN CitSci project launched to study youth learning at natural history museums in San Francisco, Los Angeles, and London.
- Launched a study of CCS in California's cooperative extension system, resulting in a report and special issue of California Agriculture.

### 2021

> Launched the CCS in Conservation graduate fellowship program, training and supporting graduate students in tools, approaches, and ethics of CCS.

Partnership with the UC Davis Center for Watershed Sciences launches the Spinning Salmon project, now engaging high school students across four counties in a large-scale, locally relevant scientific study.



- > Initiated collaborative research on impacts of CCS in residential outdoor education program at Naturebridge Olympic National Park.
- > New 4-year initiative on science synthesis and decision support for community fire resilience in Tuolomne County, funded by CALFIRE.



## 2022

- > Caring for Clear Lake project develops environmental education materials with a focus on CCS, in collaboration with UC Davis Center for Regional Change, and many local partners.
- > Initiated partnership with Kuleana Youth Empowerment NGO in Kilimanjaro, Tanzania, to integrate CCS and garden-based education into science and English literacy curricula across 10 schools.

## 2019

education ucdavis edu/ccs

2020

> Established

a new staff

education

role for youth

and students.

programming, building

capacity to serve educators

- > Our Forests 5-year project begins in partnership with Sierra Streams Institute to support and learn from teachers as they work with their students, local environmental scientists, and community organizations to study local forests and wildfire risk.
- > New multi-pronged initiative focused on CCS in Marine Protected Areas in California and Oregon, through research, capacity-building, and support of community groups and natural resource managers.
- > Co-led the first annual City Nature Challenge: Sacramento Region, an annual event promoting engagement with urban biodiversity throughout our region.
- > New partnership with UC Davis College Opportunity Programs GEAR UP Rural Valley Partnership (now in year 5) connects teachers and students in California's Central Valley with scientists through authentic research experiences.









- > Center founded by Heidi Ballard and Ryan Meyer at UC Davis School of Education.
- > New YCCS website launched, offering a framework and trove of resources to support educators.
- > Collaborative research initiated with the Public Laboratory on Open Technology and Science on civic engagement impacts of participation in environmental justice cases

around the US.





Impact Report 2024



# Making research more open, inclusive, and responsive

Embedded in the enthusiasm for community and citizen science is a proposition: that the *methods and practices* of scientific research and monitoring can and should evolve through broader participation. CCS doesn't just benefit participants; it also benefits professional scientists and can improve the research they do. CCS can open up new opportunities for discovery and understanding, and new ways of working on questions that could never have been answered without participatory approaches. Our work helps scientific partners at UC Davis and beyond do research in new ways, and together we are using collaboration to push the boundaries of what science can accomplish.

## **MENTORSHIP IN CCS SINCE 2016**

**20** 

8

Undergraduate interns

1

Graduate student researchers

**10** 

CCS in Conservation Graduate Fellows

Postdoctoral scholars





"Our team of more than 20 professional scientists is collaborating with hundreds of high school kids to solve the mystery of Thiamine Deficiency Complex in Central Valley Salmon. We could never have created a partnership, at this scale, to make the observations necessary to understand the impacts of this nutritional deficiency in California salmon without the Center's expertise in school-based CCS, and their ability to bridge science and community partners."

Rachel Johnson, NOAA



## Training the next generation of scientists

Harnessing the potential of CCS tools and approaches requires training and support, but is not a part of traditional research training in the sciences. Through our CCS in Conservation Fellowship and seminar, launched in 2022, we're providing students with a strong foundation, and ongoing hands-on support for their innovative early-career CCS endeavors. They are learning to ask new kinds of questions with new methods, work in ways that respect and include the expertise of communities and members of the public, and deepen their social and environmental impact.





"Being a CCSiC fellow has given me the knowledge, confidence, and support to explore how I can incorporate CCS approaches and data into my work, both now, as a graduate student, and in my future career."

Sage Madden, CCSiC Fellow

### RESEARCH EXCELLENCE

#### **Practitioner Products**

A Manual for Planning Your Community-Based
Citizen Science Monitoring Project for
Dam Removal and Watershed Restoration

Comprehensive guide for planning and implementing CCS projects

Next Steps for Citizen Science

Community and Citizen Science at the UC
Division of Agriculture and Natural Resources

Assessing community and citizen science in cooperative extension



## Publication

Next Steps for Citizen Science: Strategic
Investments and Coordination Are Needed for
Citizen Science to Reach Its Full Potential

Science, Volume 343, Issue 6178, 28 March 2014

# CCS training across disciplines to prepare future scientists

For over a decade, Faculty
Director Heidi Ballard has
taught courses in Participatory
Action Research to over 140
graduate students spanning
at least

13

different disciplines.

Ecology • Animal Behavior
• Geography • Community
Development • Entomology •
Pharmacology and Toxicology •
Nursing • Plant Sciences • Animal
Sciences • Environmental Policy
and Management • Education •
Linguistics • Music



# Enhancing teaching and learning through participation in real science

What do people learn when they participate in real science about environmental issues they care about? How can educators in- and out-of-school use CCS to accomplish their goals? Worldwide growth in CCS is driven in part by tremendous enthusiasm for its potential educational benefits. But these benefits don't just happen, they require careful design. Our impact on education starts with conducting rigorous research in collaboration with educators and other practitioners.

Our research-practice partnerships are advancing global understanding of how to design CCS for people learning at any age, while providing resources for thousands of educators and learners all over the world.

## Leadership on youth learning

Our research shows the potential for youth participation in CCS to dramatically improve science education. But it's not a one-size-fits-all approach. More than just conveying facts and concepts, teaching science through CCS can establish links for participants between doing science, deepening connection with place, and taking action—all of which may influence learners' identity and agency with environmental science. Incorporating young people's own lived experiences in the scientific process can benefit scientific research while uplifting diverse and often overlooked voices. Our research on youth participation in CCS, documented in our Youth-focused Community and Citizen Science (YCCS) framework, case studies, and research briefs, help educators at large and small institutions to design engaging and effective CCS programs for young people.



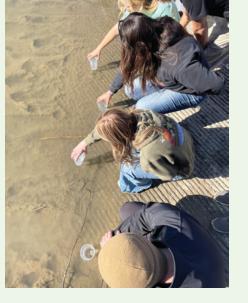
"Our research-practice collaboration with the Center has transformed the way we think about and measure the impact of our Community Science Programme. The framework of Environmental Science Agency now underpins our desired programme outcomes, and provides a pathway towards achieving our mission of creating advocates for the planet."

Lucy Robinson, Community Science Manager, The Natural History Museum, London



## Building collaborations between scientists and students

Now in its third year, the Spinning Salmon project demonstrates the power of CCS for connecting youth directly with professional scientists and local partners. Scientists have teamed up with university and agency partners to develop a protocol and lessons for 1,800 high school students monitoring juvenile Chinook salmon for signs of thiamine deficiency. Behavior and mortality data submitted by students, including those from continuation high schools, juvenile detention facilities, deaf and hard-of-hearing programs, and college opportunity programs, are used in real research to quantify the relationship between egg thiamine levels and survival.





"Working with the Center provided accessible opportunities for my Deaf high school students to do hands-on, authentic scientific research, and work directly with professional researchers for the first time in their lives."

Carly Davis, Teacher, Solano County Deaf and Hard of Hearing Program

## Research-practice partnerships advance our understanding of youth learning through CCS

## **2014-2017**

The YCCS project studied diverse cases of youth participation in CCS projects around Northern California, in- and out-of-school, to explore the essential elements of participation and examine environmental science learning outcomes.

Key Results: Environmental Science Agency, a foundational framework for understanding youth learning in CCS; recommendations for design and pedagogy focused on supporting youth and educator practices for enhanced learning.

Funder: S. D. Bechtel, Jr. Foundation Partners: Scientists, formal and informal educators across Northern California

## **2017-2020**

LEARN CitSci studied the influence of types of participation on ESA learning outcomes across outdoor and online informal science learning settings with natural history museum-led CCS in the U.S. and U.K.

**Key Results:** Recommendations focused on using scientific tools and explicit framing to promote development of identity with science across settings.

Funders: National Science Foundation; Wellcome UK; Economic and Social Research Council

Partners: California Academy of Sciences; Natural History Museum of Los Angeles County; Natural History Museum in London; Zooniverse; Oxford University; The Open University

## **2019-2024**

The Youth Community Action and Science in Our Forests project studied the impacts of three key features of CCS—collecting, analyzing and sharing data—on student environmental science learning and agency.

Key Results: Recommendations focused on youth making meaning with data and sharing findings with community partners.

Funder: National Science Foundation

Partners: Sierra Streams Institute; Nevada

County Superintendent of Schools;

3rd–5th grade teachers; forest manager community partners

IMPACT

>450

>10,000 Student participants Our collaborative research and programming with schools has reached hundreds of teachers, with many more benefiting from the materials we make freely available online.



# Helping communities lead and benefit from research

A powerful tradition within some versions of CCS has been communities taking ownership of the scientific process as part of their efforts toward environmental justice and social change. We believe this collaboration is both good for communities, and good for mainstream science institutions, such as universities and government agencies. In all of our projects, we ask "what community is served by this work?", and push institutions to expand thinking about what communities *could* be served by CCS approaches who aren't currently at the table. We link professional scientists to communities already doing similar work, to make local expertise visible and valued. We also investigate how CCS can *build* community, as people work together to solve problems and share their knowledge and skills.

CCS projects can empower communities to advocate for change based on scientific evidence. When communities and community-based organizations (CBOs) develop their own questions, diverse perspectives and local knowledge contribute to more relevant research outcomes, and more accurate representations of environmental, health, or social challenges faced by local people. Our Center pairs CBOs with professional scientists, and pushes on university systems to open channels for funding, technical assistance, and responsibility for research to flow to communities. Through extensive and growing networks involving researchers, managers, schools, public agencies, CBOs, and others, we sustain partnerships into, through, and beyond funding cycles.



"The team at UC Davis Center for Community and Citizen Science was great to work with. They worked collaboratively and listened with intention, accurately conveying the information from the local community to provide educational materials needed to support Clear Lake stewardship."

Daniella Santana, EPA Director, Habematolel Pomo of Upper Lake



## Collaborative science in prison gardens to transform relationships with nature, science, and community

Our partnership with Insight Garden Program combines the great potential of CCS for transformative learning with a prison-garden curriculum focused on reconnection to self, community, and nature. Through this work, those leaving prison also have the opportunity to bring their science home—creating safer, healthier, and more resilient communities. Our pilot activities in prisons indicate a tremendous interest and enthusiasm for CCS opportunities among incarcerated people participating in the Insight Garden Program curriculum. Here in California, home to the largest incarcerated population in the country, the potential impact of this initiative is significant. The long-term goal of this collaboration is to establish a first-of-its-kind California program in which a statewide network of people in prisons advances science that has real meaning and impact for the participants themselves, and beyond prison walls for communities and the environment.





### RESEARCH EXCELLENCE

#### **Publications**

Community-driven science and science education: Living in and navigating the edges of equity, justice, and science learning

Journal of Research in Science Teaching, Volume 60, Issue 8, October 2023



"Seeing power" between
young people and conservation
professionals in the design of
a community-based watershed
monitoring initiative

Journal of the Learning Sciences, Volume 33, Issue 1 January–March 2024



### **Curricula and Training**



Caring for Clear Lake environmental education modules

Our process of synthesizing and developing resources for environmental educators in Clear Lake shows how we listen, adapt, and form strong relationships with local communities



Collaborative grant-writing: Advice and guidance on fundraising with non-university partners



# Improving conservation, sustainability, and planetary health

Accelerating environmental challenges require collaborative efforts from scientists, policymakers, local communities, and individuals from all backgrounds. CCS fosters public engagement and collaboration as a core element of environmental research, enabling meaningful progress in environmental management. Amidst the impacts of climate change and rapid biodiversity loss, scientists from all environmental disciplines are turning to participatory approaches for collecting and analyzing data on a large scale that would be impossible with professionals alone. Land and resource managers are turning to their local communities to inventory and monitor water, air quality, and biodiversity to help make decisions on the ground. We help environmental scientists from governments, universities, and conservation organizations to design and implement CCS to support better environmental and natural resource decision-making in California and around the U.S.



"Research, program support, and leadership from the Center for Community and Citizen Science are helping the State better engage communities in science and monitoring of California's marine and coastal ecosystems."

Jenn Eckerle, Deputy Secretary, Oceans and Coastal Policy, and Executive Director, California Ocean Protection Council

## Enhancing conservation science through advice and support

Through workshops, assessments, and collaborative projects, our team has helped dozens of conservation scientists engage the public in research and monitoring, and deepen the positive impacts of their work on the environment. These professionals work with us to find partners, develop projects, and bridge between diverse sets of priorities and ways of knowing.



## Bridging scaled-up CCS with environmental decision-making

Having spent years helping to build a statewide network of volunteer-based human activities monitoring programs along the coast of California, the Resources Legacy Fund turned to us for support in synthesizing a decade's worth of data for environmental decision-making. Working closely with community-based partners in the MPA Watch network, we analyzed more than 30,000 surveys gathered by volunteers — a data gathering effort far beyond what any traditional social science project could achieve. We combined data science expertise with our deep understanding of CCS to generate insights that managers in California can use to make decisions about marine protected areas and other coastal issues.





"The Center for Community and Citizen Science has been an essential partner that we have relied on over several shared projects. Their rigorous research, along with the sensitivity and skills needed for collaboration with diverse partners, results in effective support of environmental conservation."

Kaitilin Gaffney, Director of Conservation, Resources Legacy Fund

#### RESEARCH EXCELLENCE

#### **Publications**

Lessons learned
from community
and citizen science
monitoring on
the Elwha River
restoration project

restoration project

Frontiers in Ecology
and Evolution,

Volume 11, September 2023

Collaborative research as boundary work: learning between rice growers and conservation professionals to support habitat conservation on private lands

Agriculture and Human Values, Volume 39, December 2021

Conservation Outcomes of Citizen Science

Citizen Science: Innovation in Open Science, Society and Policy, 2018

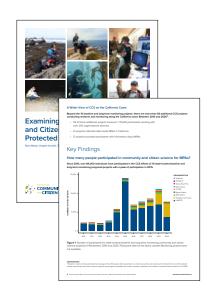
#### Practitioner Products

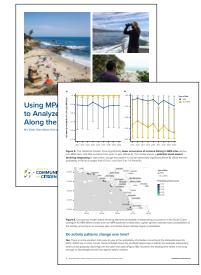
Examining the Role of Community and Citizen Science in Marine

Protected Area and Using MPA Watch Data to Analyze Human Activities

Along the California Coast

Two reports submitted to the state of California are helping to shape CCS strategies in coastal and marine conservation





#### ► FUNDERS AND COLLABORATORS

## Thank you to our partners, funders, and collaborators!

Formal Education: Benicia Unified School District • Cottage Hill School, Pleasant Ridge Union District • Dixon Unified School District • Fairfield-Suisun Unified School District • Grass Valley Charter School, Grass Valley School District • Hamilton Unified School District • Kokirie Secondary School, Killimanjaro, Tanzania • Lake County Office of Education • Lyrakrim Secondary School, Killimanjaro, Tanzania • Mamba Secondary School, Killimanjaro, Tanzania • Maringeni Secondary School, Killimanjaro, Tanzania • Mieresini Secondary School, Killimanjaro, Tanzania • Nevada City School of the Arts • Nevada County Superintendent of Schools • Nuru English Secondary School, Killimanjaro, Tanzania • Orland Unified School District • Pierce Joint Unified School District • Red Bluff Joint Union High School District • Sakayomosha Secondary School, Killimanjaro, Tanzania • Seven Hills School, Nevada City School District • Solano County Office of Education • Travis Joint Unified School District • Vallejo City Unified School District • Williams Unified School District • Williams Ranch School, Penn Valley Union District • Willows Unified School District • Winters Joint Unified School District • Woodland Joint Unified School District • Yolo County Office of Education / Government: Blue Ribbon Committee for the Rehabilitation of Clear Lake • California Coastal Conservancy • California Department of Fish and Wildlife • California Environmental Protection Agency • California Natural Resources Agency • California Ocean Protection Council • California State Parks • California Department of Water Resources • Fairfield Suisun Sewer District • Lake County Resource Conservation District • National Institute of Food and Agriculture • National Ocean and Atmospheric Agency • National Park Service • National Science Foundation • Oregon Department of Fish and Wildlife • U.S. Fish and Wildlife Service • U.S. Forest Service • U.S. Geological Survey / Informal Education: California Academy of Sciences • California Environmental Literacy Initiative • London Natural History Museum • MERITO Foundation • Natural History Museum of Los Angeles County • NatureBridge • Pacific Grove Museum of Natural History • Pepperwood Preserve / Other Non-profit: American Geophysical Union • Bear Yuba Land Trust • Coastal Watershed Institute • Eagle Eyes of False Klamath Cove • Environmental Action Committee of West Marin • Greater Farralones Association • Heal the Bay • Insight Garden Program • Kuleana Youth Empowerment, Tanzania • Los Angeles Waterkeeper • Nevada Irrigation District • North American Association for Environmental Education • Ojai Valley Land Trust • Orange County Coastkeeper • Public Laboratory for Open Technology and Science • Reef Check California • Santa Barbara Channelkeeper • Sierra Streams Institute • Solano Land Trust • Tehama County Resource Conservation District • The CREW • The Nature Conservancy • Thriving Earth Exchange • Trout Unlimited • Watershed Education Network • WILDCOAST • Wolf Creek Alliance • Zooniverse • Association for the Advancement of Participatory Sciences • Center for Land-Based Learning • East Bay Academy for Young Scientists • Long-term Monitoring Program and Experiential Training for Students (LiMPETS) • Lake County Land Trust • Redbud Audubon / Private Funder: David & Lucile Packard Foundation • Gordon and Betty Moore Foundation • Resources Legacy Fund • Rita Allen Foundation • S.D. Bechtel, Jr. Foundation / Tribes: Big Valley Band of Pomo Indians • Habematolel Pomo of Upper Lake • Lower Elwha Klallam Tribe • Middletown Rancheria of Pomo Indians • Robinson Rancheria Pomo Indians • Scotts Valley Band of Pomo Indians • Tolowa Dee-Ni' Nation / University: California State University, Bakersfield • Cornell Lab of Ornithology • Oregon State University • Oxford University • Peninsula College • State University of New York, Brockport • The Open University • UC Division of Agriculture and Natural Resources • UC Environmental Stewards • UCD Bohart Museum of Entomology • UCD Center for Regional Change • UCD Center for Watershed Sciences • UCD Coastal and Marine Sciences Institute • UCD College Opportunity Programs • UCD Data Lab • UCD Ecology & Evolution, Wild Davis • UCD Feminist Research Institute • UCD Institute for the Environment • UCD Office of Public Scholarship and Engagement • UCD Sacramento Area Science Project • UCD Student Farm • University of Washington

Right: The Center facilitated discussions of CCS and dam removal as part of the Elwha ScienceScape gathering on the Olympic Peninsula. Back cover: In a YCCS case study, high school students learned "balloon mapping" methods pioneered by the Public Laboratory for Open Technology and Science.



