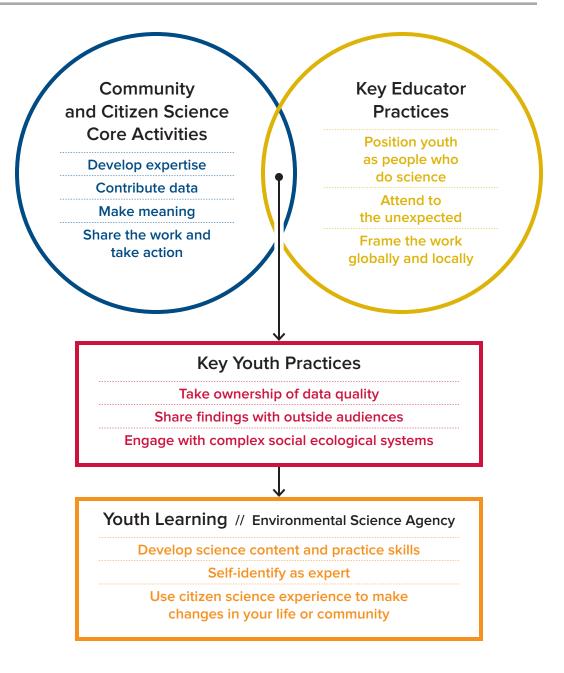# Framework for Youth Learning in Community and Citizen Science

CENTER FOR COMMUNITY AND CITIZEN SCIENCE

At the University of California, Davis

THIS REASEARCH-BASED FRAMEWORK[1]
is intended to help educators facilitate community and citizen science (CCS) activities in ways that support youth learning. CCS activities[2,3,4] alone won't necessarily promote meaningful science learning. Our case study research identified several Key Youth Practices which, when supported by Key Educator Practices, can create opportunities for consequential youth learning. More detail is available at yccs.ucdavis.edu.

Connection to the Next Generation Science Standards (NGSS)

Using the Key Educator Practices during CCS activities can help engage youth in the NGSS Science and Engineering Practices and capitalize on the learning opportunities of real-world investigation[5]. Also, consider grade level Disciplinary Core Ideas when selecting a CCS project, and integrate Cross Cutting Concepts, such as "patterns" or "stability and change", during data collection and meaning-making activities.

1. Ballard, H.L., Dixon, C.G., Harris, E.M. (2016). Youth-focused citizen science: Examining the role of environmental science learning and agency for conservation. *Biological Conservation.*
2. Strauss, A. L., Homayoun, T., Meyer, R. L., Nippolt, P. L., Oberhauser, K., Peterson, C., Rager, A., & Young-Isebrand, E. (2015). Driven to discover: Facilitator's guide to citizen science. St. Paul, MN: University of Minnesota Extension.
3. Fee, J. M., 2015. BirdSleuth: Investigating evidence. Ithaca, NY: Cornell Lab of Ornithology.
4. Herszenhorn, L. B., Johnson, R.F. and Young, A.N. (2015). Citizen science toolkit: Teaching science through citizen science. San Francisco, CA: California Academy of Sciences.
5. Harris, E.M., Ballard, H.L., Passmore, C. (In preparation). Opportunities for youth engagement in scientific practice through citizen science.

Community and Citizen Science Core Activities

Develop expertise

Contribute data

Make meaning

Share the work and take action

Key Educator Practices

Position youth as people who do science

Attend to the unexpected

Frame the work globally and locally

Key Youth Practices

Take ownership of data quality

Share findings with outside audiences

Engage with complex social ecological systems

Youth Learning // Environmental Science Agency

Develop science content and practice skills

Self-identify as expert

Use citizen science experience to make changes in your life or community

Community and Citizen Science Core Activities

ACTIVITY	EXAMPLES
Develop expertise Develop youth interest and gain proficiency with data collection	> Introduce the project > Learn from field guides > Observe and sketch specimens > Practice collecting or identifying organisms > Work with a local expert
Contribute data Collect and upload data	> Small group practice > Develop specific roles > Develop peer leaders > Review and compare data > Investigate monitoring site
Make meaning Reason and reflect about the data and experience	> Analyze data by identifying species, describing patterns, and making graphs > Further investigate based on youth questions > Reflect on experiences
Share the work and take action Apply understandings and extend the work beyond the classroom	> Present to other classes > Talk to local citizen scientists > Share findings with stakeholders such as local organizations, school leaders, city council, and parents

Key Educator Practices

Position youth as people who do science
Help youth take on meaningful roles during the CCS investigation by engaging them in the discussions, deliberations and meaning-making practices of science.

Attend to the unexpected
Pay attention to interesting surprises that come from the natural world or youth and incorporate them into instruction.

Frame the work globally and locally
Frame the work simultaneously as part of broader global scientific endeavors as well as locally relevant issues around the study site or community.

Key Youth Practices

Take ownership of data quality
Young people take responsibility for ensuring high quality CCS data collection and analysis.

Share findings with outside audiences
Youth share findings from their work with audiences such as administrators, scientists, and community stakeholders.

Engage with complex social ecological systems
Youth think about the interactions between humans and nature and consider the role they and their communities play.

Get additional tips for implementation at **yccs.ucdavis.edu/key-practices**.

Youth Learning // Environmental Science Agency

Environmental science agency—the ability to use experiences from environmental science investigations to make positive changes in one's life and community—consists of the following three interdependent aspects.

Develop science content and practice skills
Through participation in scientific practices, youth learn environmental science content and develop scientific reasoning skills.

Self-identify as expert
Youth recognize their own developing expertise by taking on specialized roles in the scientific or social aspects of the project.

Use citizen science experience to make changes in your life or community
Youth take actions—big or small—with environmental science to create personal and community change.

Learn how educators and scientists have implemented these activities and practices in the field at **yccs.ucdavis.edu/case-study**.

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To learn more about The Center for Community and Citizen Science, visit us at **education.ucdavis.edu/ccs**.