What about the volunteers? A toolkit for evaluating learning outcomes of volunteer participation in water quality monitoring programs.

Tina Phillips, Cornell Lab of Ornithology
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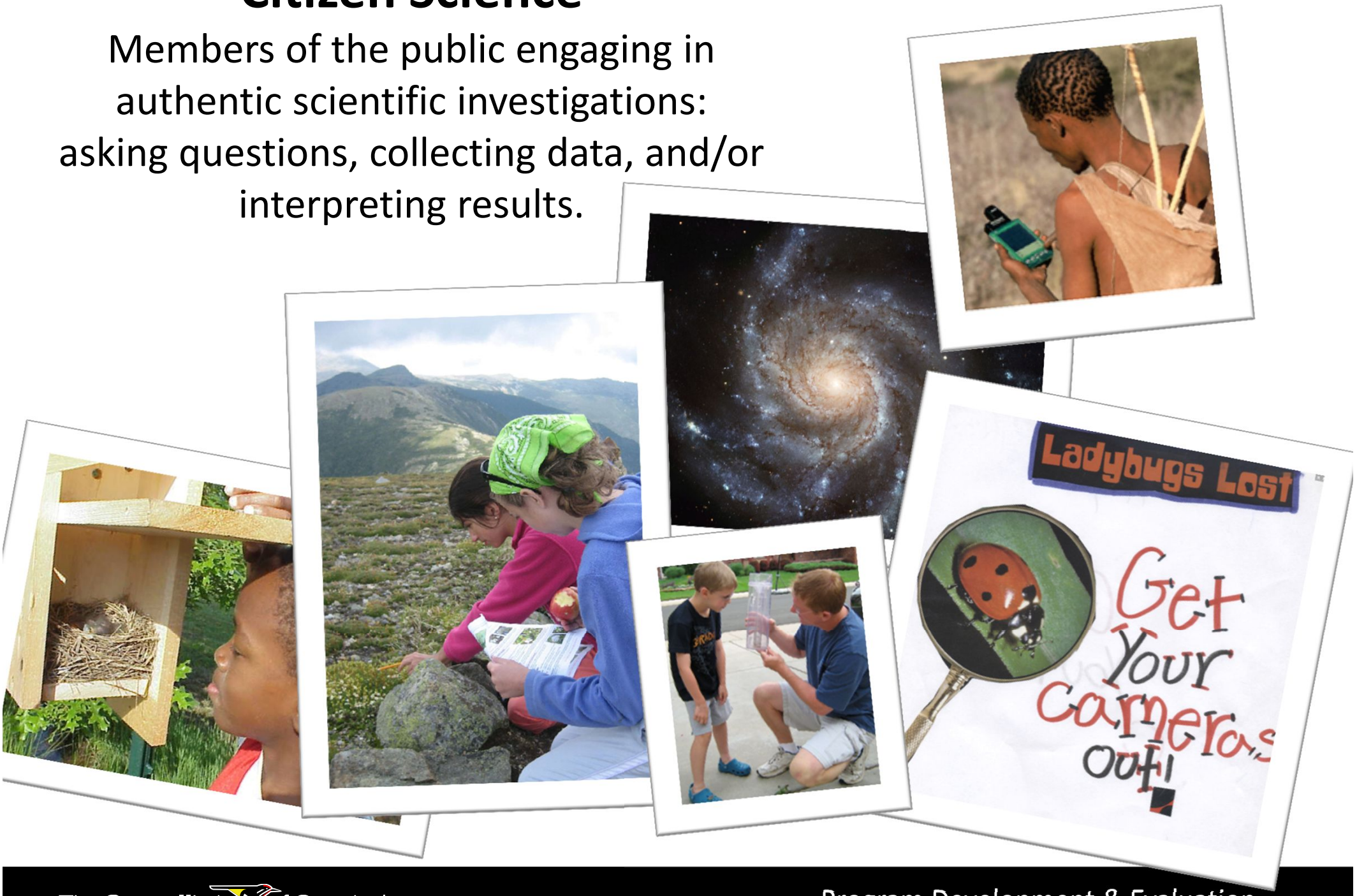
Matthew Minarchek, Cornell Lab of Ornithology
Rick Bonney, Cornell Lab of Ornithology

birds.cornell.edu

*A membership institution interpreting and conserving the earth's biological diversity through research, education, and **citizen science** focused on birds*

Citizen Science

Members of the public engaging in authentic scientific investigations: asking questions, collecting data, and/or interpreting results.



Citizen Science

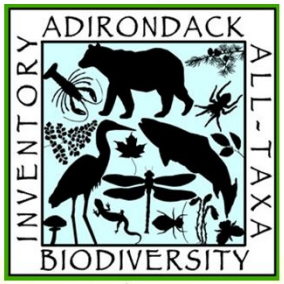
Clean Annapolis River Project

The Kansas Biological Survey, University of Kansas

Monarch Watch

Dedicated to Education, Conservation, & Research

Operation Bluetongue

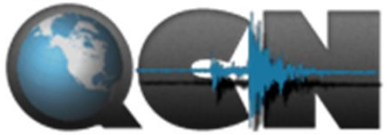


THE GLOBE PROGRAM
CONNECTING THE NEXT GENERATION OF SCIENTISTS

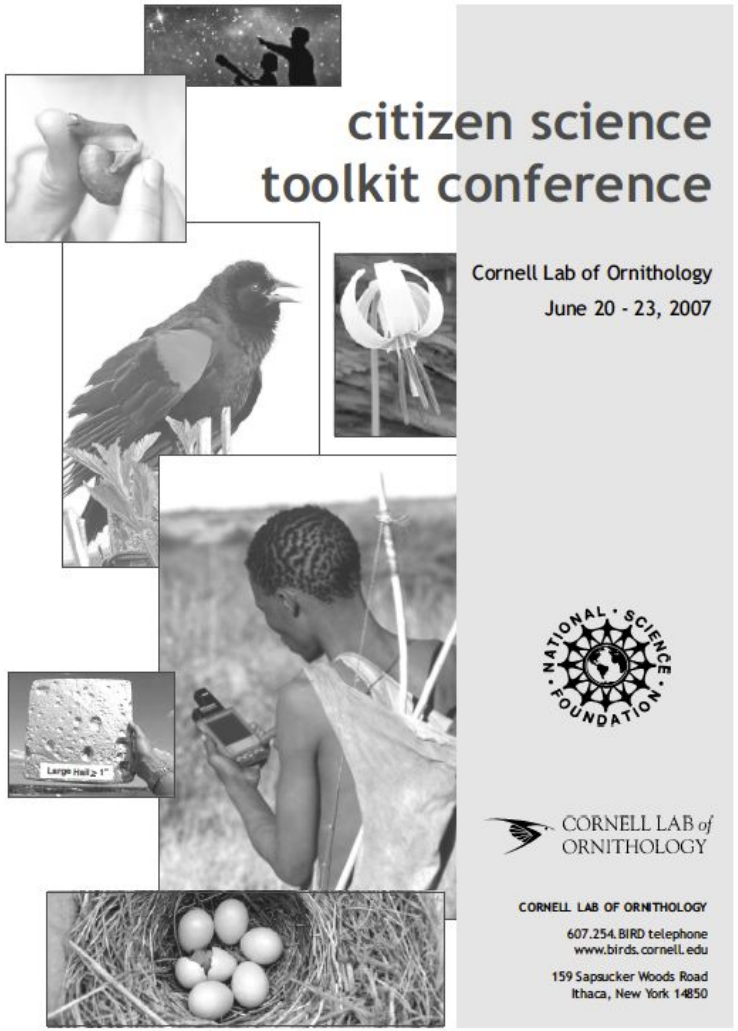
EVolution MegaLab

COAST

Project BudBurst
www.budburst.org



Citizen Science Toolkit Conference, 2007



citizenscience.org

Home

Welcome! The Alliance for Aquatic Resource Monitoring (ALLARM) is a project of the Environmental Studies Department at Dickinson College. Since its founding in 1986, ALLARM has become a nationally recognized technical and programmatic support center for community organizations interested in watershed assessment, protection, and restoration

About ALLARM

Technical Assistance

Stormwater

Environmental Education

Center for the Advancement of Informal Science Education (CAISE)

CAISE Inquiry Group Report, July 2009

Public Participation in Scientific Research: Defining the Field and Assessing its Potential for Informal Science Education

Bonney, R., Ballard, H., Jordan, R., McCallie, E., Phillips, T., Shirk, J., and Wilderman, C.

Findings from CAISE Report

- Different models of engagement, from “top-down” to “bottom-up”
- Each model has strengths & weaknesses
- Higher engagement suggested deeper learning
- Scarcity of quality evaluations
- Need for more sensitive measures
- No opportunity for cross-programmatic analyses
- Cry for help!

“It was a cry for help, really – I tried to slash my wrists with rollerblades.”

DEVISE

Developing, Validating, and Implementing Situated Evaluation Instruments to Assess the Impacts of PPSR

GOAL:

Improve evaluation quality and capacity across environmentally-based PPSR projects

OBJECTIVES:

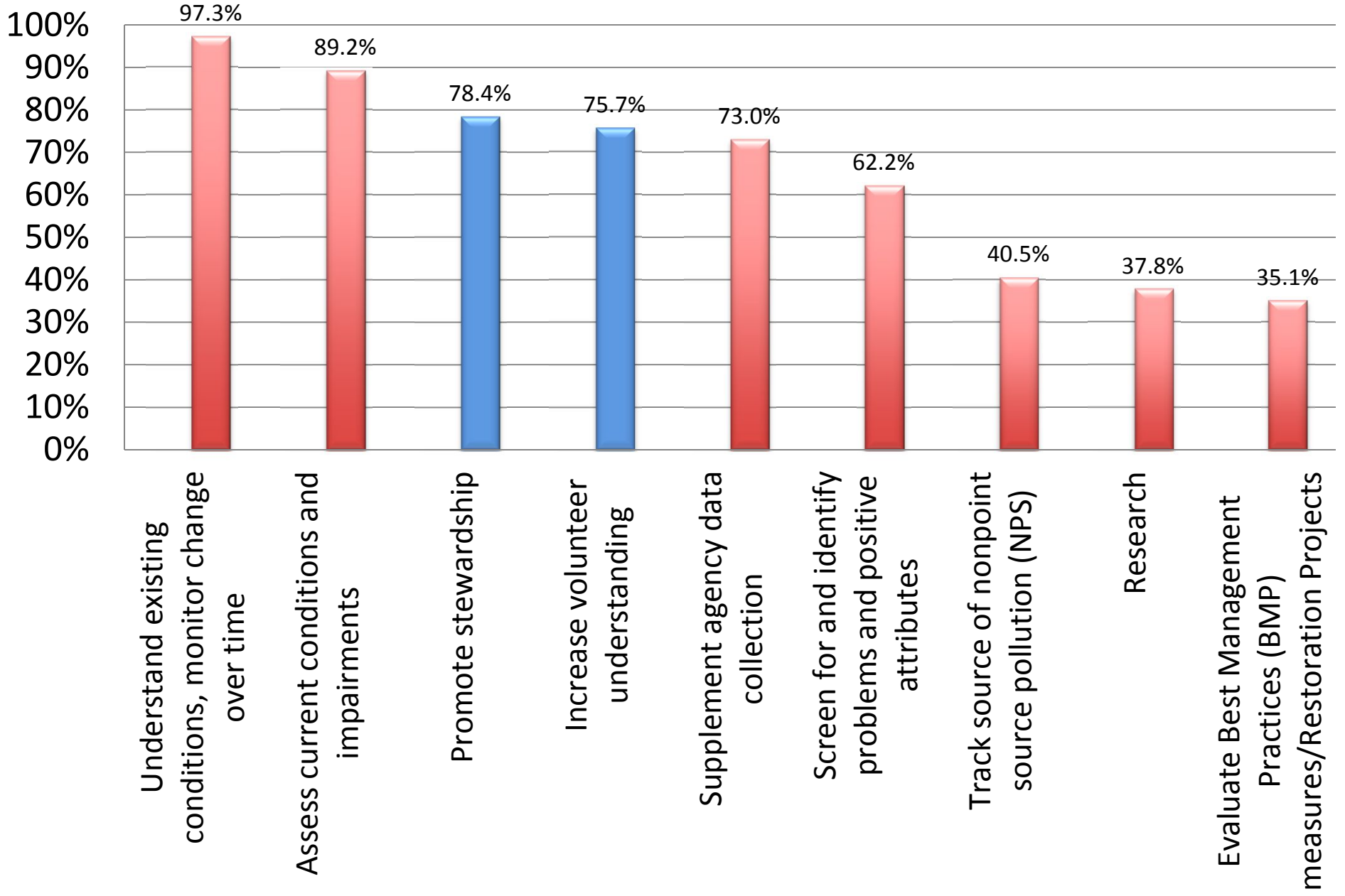
- Develop and test customizable, yet generalizable measures
- Implement evaluation strategies with case studies
  - Water quality monitoring, underserved youth, traditional citizen science projects
- Build community of practice for evaluations of PPSR projects

PPSR Logic Model

Current State of WQM Evaluation

- Survey conducted in 2011; n=38
- About 56% of projects are non-profit or state-run programs
- 51% of projects have fewer than 100 people
- Nearly 60% of projects have been operating for more than 11 years
- 65% have conducted evaluation; of these, more than half (57%) used internal staff
- 37% Front-end; 41% Formative; 67% Summative; 50% workshop evaluation
- Everyone is using different materials and creating things from scratch…

Main reasons for data collection



Main reasons for evaluation

(in descending order)

- Data quality
- Key educational goals
- Improve/refine program
- Volunteer experience/satisfaction
- Assess volunteer expertise
- Trainings/workshops
- Volunteer retention
- Determine utility, gaps in data
- Determine program efficacy

Key Educational Goals

- Engagement and/or interest in science content, process, careers, and/or environment
- Knowledge of science content, process, careers, and/or environment
- Behavior changes resulting from participation
- Science inquiry skills (asking questions, designing studies, data collection and analysis, using technology)
- Attitudes toward science content, process, careers, and/or environment

Why has evaluation not been conducted?

- Not enough staff expertise – 0%
- Lack of financial resources – 28.6%
- Not enough internal support – 0%
- **Too time consuming – 42.9%**
- I am not sure where to begin – 28.6%

Top Priorities for Help & Resources

Help:

- Creating or finding appropriate survey instruments
- Developing goals, objectives, and indicators
- Analyzing and interpreting data
- Implementing findings from the evaluation
- Developing logic models

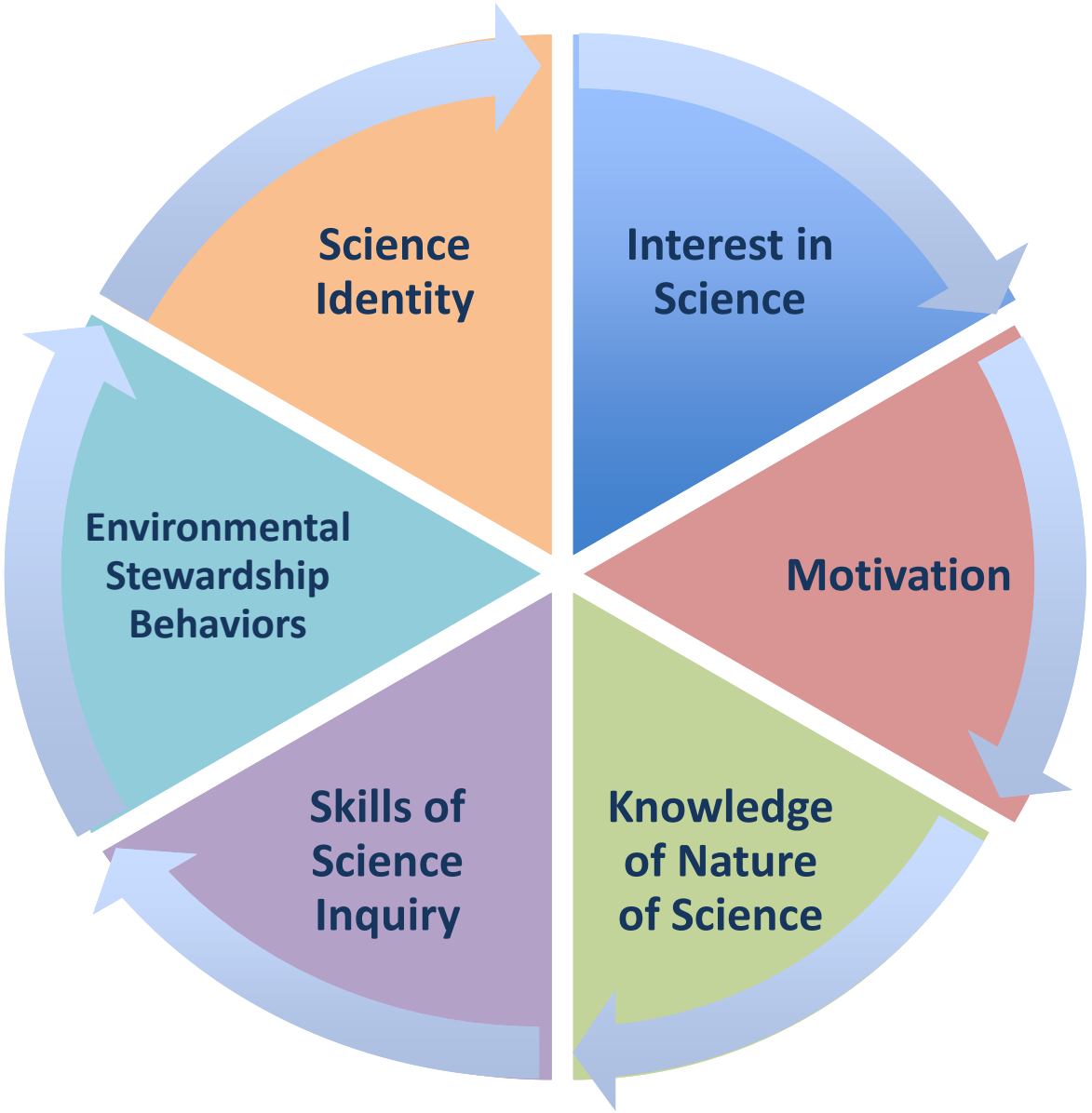
Resources

- Database of surveys and data collection instruments
- Evaluation reports from volunteer monitoring projects
- Examples of possible evaluation designs
- An entry level User's Guide for conducting evaluations

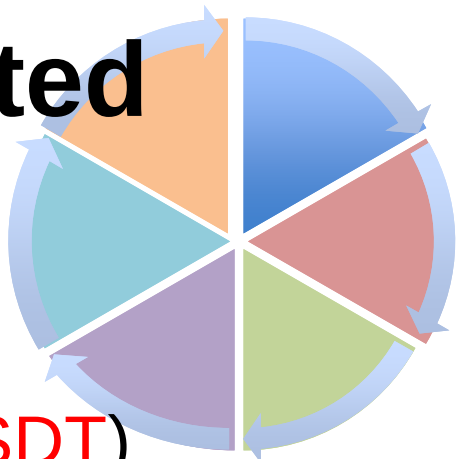
Framework Development

- Literature review
- Determine common goals, objectives, & indicators across 200+ projects
- Inventory 180+ STEM related instruments
- Gather psychometric information on selected scales
- Modify/develop new instruments aligned to framework

Framework 2.0

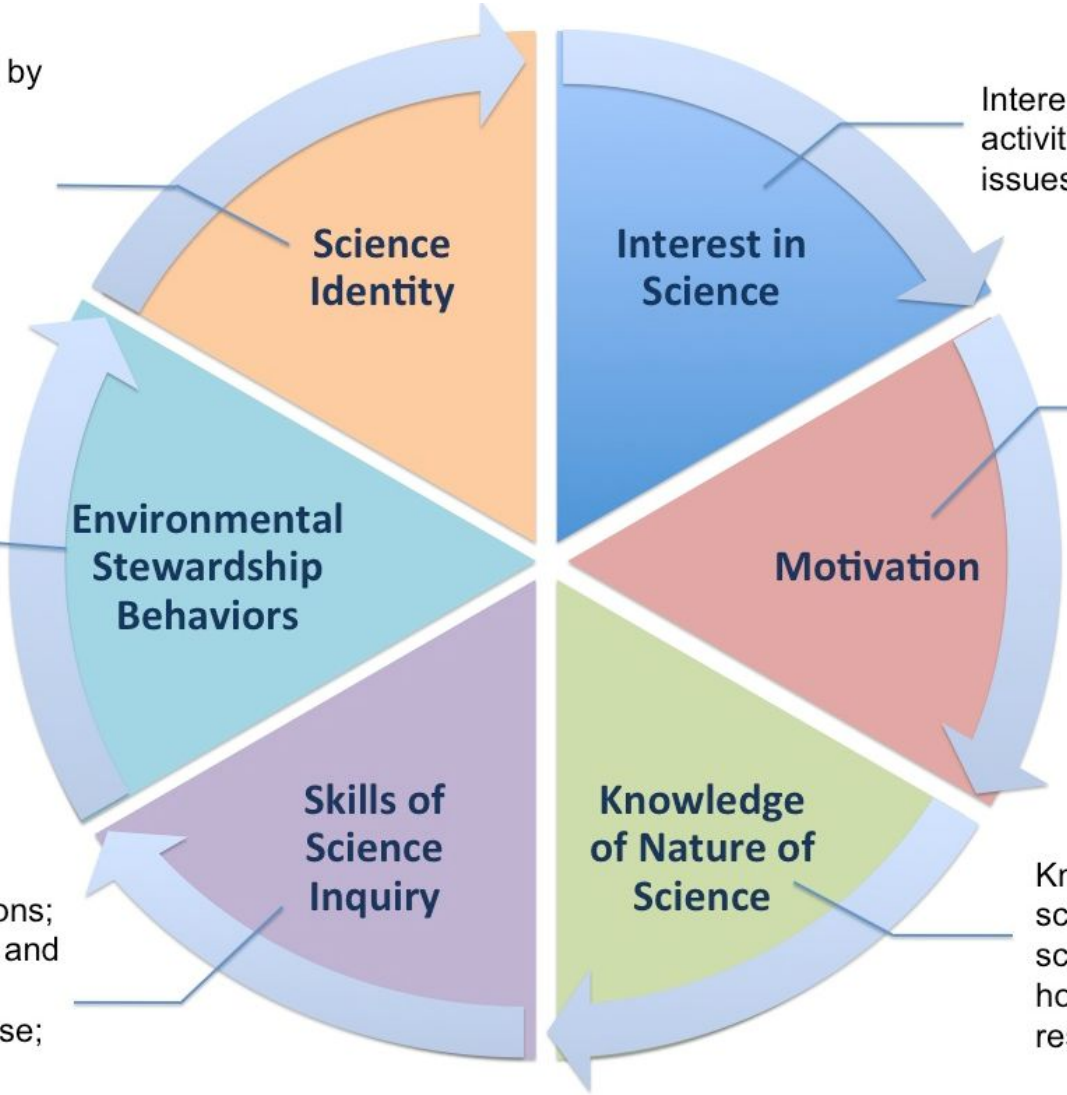


Scales currently being tested or under development



- Interest in science for kids & adults
- Efficacy toward stewardship (modified from SDT)
- Efficacy toward science learning (modified from SDT)
- Motivation toward science learning for kids & adults
- Motivation toward conservation
- Knowledge of the Nature of Science & science process
- Self efficacy toward science inquiry skills
- Data interpretation skills databank
- Environmental stewardship retrospective pre/post
- Science and environmental identity
- Water Quality Knowledge Quiz
- Sense of Place
- General measures of satisfaction & engagement

Contact me if you want to test any of these measures with your group!



Identification as a science learner both by self and others, recognition of agency and fluency in learning and doing science, affiliation with the science community

Interest in science topics, activities, environmental issues

Motivation and self-efficacy to pursue science related goals such as STEM careers and project activities

Knowledge of the nature of science; understanding of the scientific process and how science is conducted by researchers

Procedural skills such as asking questions; designing studies; collecting, analyzing and interpreting data; experimenting; argumentation; synthesis; technology use; and communication

Behavior change resulting from participation such as place-based and global stewardship, new participation, and community or civic action.

Next Steps

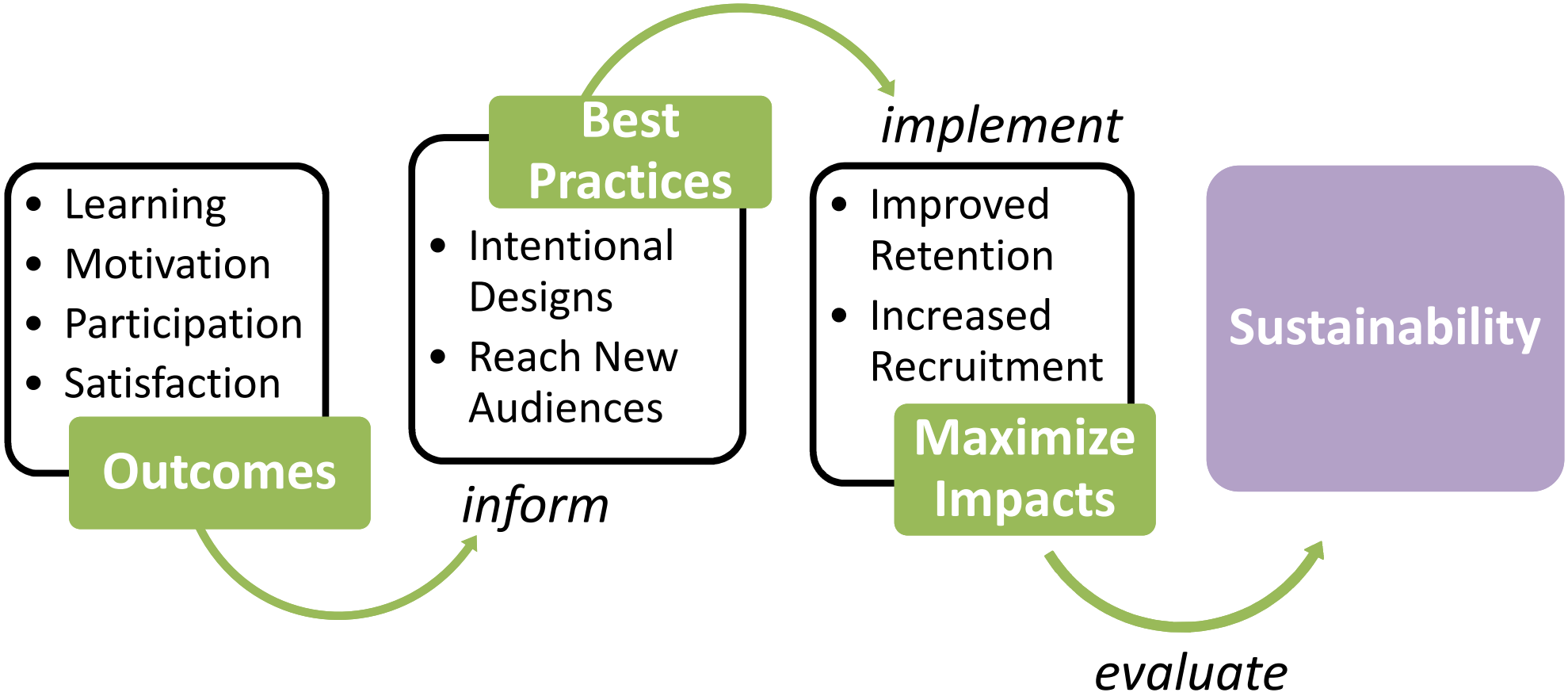
- Test and validate scales on a variety of projects:
  - eBird, Streamkeepers, ALLARM
  - Noyce Foundation funding for culturally responsive evaluations – CUBS, BirdSleuth
- Draft evaluation plans, test/modify scales for situated evaluations
- Recruit new projects/programs to test tools and strategies
- Develop professional development tools
- Support evaluations of external partners

DEVISE Online Toolkit

. . . for non-evaluators to conduct quality evaluations

- Aligning goals & objectives
- User's Guide to evaluation
- Database of tested scales
- Case study evaluations
- Tutorials & resources
- Support & consultation
- Research on learning

Why does evaluation of learning outcomes matter?



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Thank you!

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