

INVESTIGATION:
What Changes are People Noticing in the Water Cycle?

Grade Level: 5th grade through Adults

Time Required: 45-60 minutes discussion, 1-4 hours research and writing

Materials:

- ✓ Worksheet: What Changes are People Noticing in the Water Cycle?

Summary: Participants pick a place that is meaningful to them and do some research about what changes people are noticing with the water cycle there. This research can be assigned as homework, or can be done while in the group setting, solo or in teams of two or three. After completing their research, participants report back in writing, orally, or in a creative form such as video, poem, story, skit, poster, etc. After hearing each other's reports participants will have a context for further study, with concrete examples of how water issues impact society, land systems, and the environment.

I strongly suggest that participants return to this research later in the learning process (at the end of the semester, workshop, or year) and answer similar questions to see how their understanding of connections between soil biology, water, and land-management decision-making processes have deepened, and how their own feelings have changed. If the learning process is successful, they will have a greater sense of agency, and a greater vision of the possibility for change.

Goals

Participants will be able to

- Identify a current change in the water cycle
- Summarize the facts
- Report on the impact
- Express their feelings about the issue
- Hypothesize about possible connections to soil biology and land management
- Attempt to address the issue within their current knowledge base
- Describe the range and impact of current issues with water around the world after hearing and discussing a variety of reports.



Assessment: Participants will successfully prepare a report (written or creative), present the key details to peers and to the group, and engage in a group discussion.

EDUCATIONAL STANDARDS

Next Generation Science Standards

Performance Expectations:

HS-ESS3-1: Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

Science and Engineering Practices:

Asking Questions and Defining Problems, Constructing Explanations and Designing Solutions

Disciplinary Core Ideas:

LS2.A Interdependent Relationships in Ecosystems. **LS2.C** Ecosystem Dynamics, Functioning and Resilience. **LS4.C** Adaptation. **LS4.D** Biodiversity and Humans.

ESS2.A Earth's Materials and Systems. **ESS2.C** The Roles of Water in Earth's Surface Processes. **ESS2.D** Weather and Climate. **ESS3.A** Natural Resources. **ESS3.B** Natural Hazards. **ESS3.C** Human Impacts on Earth Systems.

ETS1.A Defining and Delimiting an Engineering Problem. **ETS1.B** Developing Possible Solutions.

Crosscutting Concepts:

Patterns, Cause and Effect, Systems, Stability and Change

Common Core State Standards

SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

RI.11-12.7 Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.



Activity

Opening Question

- › *What have people heard in the news in the past year related to changes in the water cycle?*

Write all the answers on the board.

Pick one or two examples and ask people a few of the questions from the worksheet.

Research Assignment

(Decide whether this will be an in-class or homework assignment, and how long participants should spend on it.)

Hand out the worksheet “What Changes are People Noticing in the Water Cycle?”

Tell them they will be doing some research and coming back to the group with a report. Point out that the report should include *facts* from the research as well as their own *thoughts* and *feelings*. Suggest that they can be creative: they can write a report, but they could also compose a song, write a poem, create a skit, make a poster, or put together a short video or slide presentation.

- ➔ **Note:** if your participants are unlikely to take a creative risk on their own, you can assign it as a creative project: i.e. “*Everyone is going to do a skit...*” or “*everyone is going to make a short video...*”

Tell them how long they will have to do the research.

Small Group Discussion

After the research is completed, come back together.

If the group is large, have people break into groups of three or four.

Set a timer for two minutes, and have each person take two minutes to share what they learned from their research within their smaller group.

Large Group Discussion

Have each person share their report, or if time is limited, have them share some highlights of what they learned with the larger group.

Assign a scribe to make a list of new words or concepts that people came across in their research, and write them on a large sheet of paper. Define them in class, or assign as homework.



Connecting the Dots

- › *What social, economic, or environmental themes are you noticing that connect the various issues?*

Write the themes on the board. (Answers might include conflicts, expense of fixing the problem, political or cultural barriers to change, community level organizing, academic research or citizen science attempts to quantify the issue, effects on human health.)

Wrap Up

Ask participants to form a circle and take turns answering these questions:

- › *What did you learn today and how do you feel about it?*
- › *What new questions do you have?*

Have them take a sticky note or index card and write down their questions to give to you.

Important: Return to the Assignment Later

Ask participants to reread their initial reports near the end of the learning process (semester, course, workshop) and answer the following questions:

- › *What new insights or information about this situation do you have since you did this report?*
- › *Do you have any new ideas of how you might address this issue if you were in charge?*
- › *Do you feel more or less hopeful about this situation?*