

HOW CLEAN IS OUR WATER?

Duration	Age	Difficulty
45 min	11-12	Medium
#WATERQUALITY #STEM #ENVIRONMENT #ECOLOGY		

DESCRIPTION

In this field-to-lab activity, students will investigate the quality of local water sources by collecting and analyzing water samples.

They will use real testing kits to examine pH, turbidity, and nitrate levels, apply scientific methods, and explore environmental challenges linked to water pollution.

Through teamwork, observation, and analysis, students will strengthen their understanding of ecosystems and their role in protecting clean water for all living organisms. By the end of the activity, students will be able to assess water quality using scientific methods.

KEY COMPETENCES (EU)

- Mathematical competence and competence in science, technology, and engineering
- Citizenship competence
- Personal, social, and learning to learn competence
- Digital competence
- Entrepreneurship competence

ACTIVITY OBJECTIVES

- **Understanding water ecosystems:** Investigate how natural and human factors influence water quality in ecosystems, focusing on variables like pH, turbidity, and nitrate levels.
- **Applying the Scientific Method:** Develop experimental skills by conducting fieldwork and lab analysis of collected water samples, interpreting results to draw scientific conclusions.
- **Using technology in environmental science:** Utilize digital tools and testing kits to collect, record, and analyze data, integrating scientific and technological skills.
- **Building critical and collaborative skills:** Strengthen teamwork, communication, and critical thinking through group-based investigation and problem-solving tasks.
- **Raising environmental awareness:** Connect water testing results to larger environmental and sustainability issues, fostering reflection on pollution and ecosystem health.

MATERIALS



Water testing kits (pH, nitrate, turbidity)



Sample containers



Gloves

- Provided by students
- Provided by the teacher/institution
- Downloadable Elements



Maps of local water bodies (optional)



Camera or smartphone (optional, for documentation)



Notebooks and pens



[Data recording sheet](#)

PREVIOUS PREPARATION

- Pre-select a safe, accessible site (stream, pond, or lake) for water sampling.
- Organize students into teams with assigned roles (e.g., sampler, analyst, recorder).
- Ensure all materials are ready: testing kits, containers, gloves, maps.
- Review safety protocols for fieldwork and lab analysis.
- Prepare data sheets or notebooks for recording results.
- If possible, schedule a follow-up reflection session to compare findings.

CONTEXTUALIZATION AND ADAPTATION

Water is essential for life – but how clean is the water in our local environment?

This activity encourages students to become environmental scientists by exploring water quality firsthand. They'll investigate factors like **pH, turbidity, and nitrate levels** and connect this knowledge to real-world concerns like **pollution, biodiversity loss, and human health**.

The project helps learners develop scientific inquiry, teamwork, and eco-awareness – while applying core STEM concepts in a hands-on, meaningful way.

This challenge can be adapted for:

- Younger learners → simpler tests (pH, color clarity, temperature)
- Older learners → add local policy research or propose real solutions

Classroom activity 💡:

Ask:

“What do you think makes water clean or polluted?”

→ Facilitate a class discussion on visible (e.g., trash, murky water) and invisible (e.g., bacteria, chemicals) pollutants. Use a whiteboard or digital tool to collect students' hypotheses before conducting any tests. Encourage all voices, especially quieter students, to contribute.

„What would happen if polluted water was the only source available?”

→ Prompt learners to explore the social, economic, and health impacts of limited clean water access. Include discussion on how different groups (e.g., children, women, low-income communities) are affected, integrating a gender and equity lens.



Watch video 🎥 (optional):

💧 ["What is Water Pollution?"](#)



Water pollution occurs when harmful substances contaminate water bodies, making them unsafe for humans and wildlife. Common pollutants include chemicals, waste, and plastics. Clean water is vital for drinking, agriculture, and maintaining healthy ecosystems. Protecting water sources ensures the well-being of all living organisms and the environment.

[The Story of: Rachel Carson | Stories in STEAM | Storytime!](#)



Rachel Carson was a writer, a scientist, *and* an ecologist! Rachel went on to use her writing skills to write for the radio and science articles about conserving the earth. She even wrote books and shared her knowledge about how to protect the environment. One of her most famous books was called *Silent Spring*, about the harm of pesticides. Many people did not like what she had to say but that did not stop her to tell people how to protect the earth.

Sylvia Earle, known as "Her Deepness," is a renowned oceanographer and explorer. She has dedicated her life to studying and protecting the oceans.

She once said: *"With every drop of water you drink, every breath you take, you're connected to the sea. No matter where on Earth you live."*



Note for teacher:

Students choose a female scientist to research and present her contributions as part of their final presentation.



ACTIVITY

STEP 1: Prepare the equipment and roles

Organize students into teams of 3–4 people and **assign collaborative roles** that rotate during the project to ensure **skill development**:

- **Sampler:** Collects water samples from designated locations.
- **Data Collector:** Records observations, field notes, and lab test results.
- **Analyst:** Interprets and visualizes the data.
- **Safety Monitor:** Ensures safe handling of samples and equipment.

Note for teacher: Consider assigning **leadership roles across genders**. Assign rotating roles to ensure gender balance.

Distribute materials to each group: testing kits, gloves, sample containers, maps, data sheets, and notebooks. Review safety guidelines for outdoor work and lab procedures.

Remind students of safety protocols, especially when working outdoors or handling chemical tests. Encourage mutual accountability and clear communication within teams

INVESTIGATION STARTS: ROLES & SAMPLE COLLECTION





STEP 2: Collect water samples

Visit a nearby **pre-selected safe location** (stream, pond, lake). Ensure every student follows safety instructions: wear gloves and goggles, and remain with the group.

Each team should:

- Collect **1–2 labeled water samples** in sealed containers
- **Record field notes** on the following conditions:
 - ✓ Weather conditions
 - ✓ Water clarity or discoloration
 - ✓ Any visible signs of pollution (e.g., plastic waste, algae blooms, foam, oil sheen)

Optional: Assign one student as the visual documentarian to take photos or short clips for use in later storytelling or data presentation



Alternative if visiting a water body is not possible: If a field trip to a natural water body cannot be arranged, students can instead collect water samples from different sources within the school. For example: from the drinking fountain, bathroom sink, bottled water, or any other available sources.

STEP 3: Analyze the water quality in the classroom

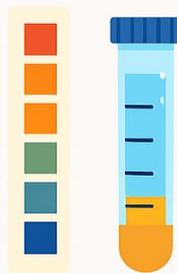
Return to the classroom for **lab-based testing**. Provide teams with testing kits and a pre-designed results table. Test each sample for:

- pH (strips or digital meter):
- Turbidity (tubes or visual scale)
- Nitrates (chemical indicators or color comparisons)

TESTING & DOCUMENTING WATER QUALITY

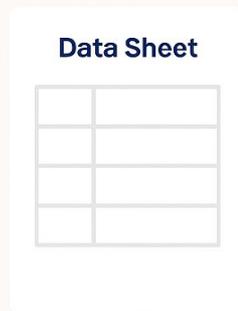


pH strip



Turbidity tube

Data Sheet



Data sheet



Magifyingk



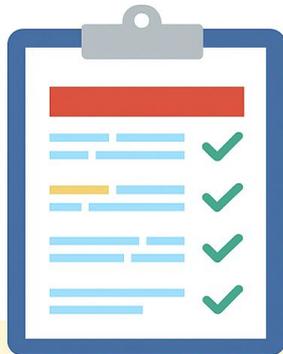
Data recording: Each group records the test results in a pre-designed table. Add observations (e.g., “Sample B had much lower pH than others”).

Compare and reflect: After testing, compare your findings with EPA water quality standards and ask students to explain inconsistencies or propose hypotheses.

Optional: Each group will create a digital chart summarizing test results (e.g. using Google Sheets or another digital tool)

WHAT DID WE DISCOVER?

FINDINGS



FINDINGS

REFLECTION



REFLECTION

STEP 4 – Discuss and interpret the data

Within groups, analyze:

- Are values within healthy ranges?
- Any surprising measurements?
- Which site had the best/worst water quality?
- What possible causes (e.g., urban runoff, nearby farms, industrial activity) might explain poor results?

Encourage collaborative analysis where every team member contributes insights—highlighting equity of voice and diverse perspectives.

Teams write short summaries of their findings. Encourage the use of drawings, storyboards, or illustrated journals alongside numeric data (e.g., teams design an infographic that summarizes their water analysis results and environmental significance.)



STEP 5 – Share findings with the class

Each team presents their findings to the class in a **structured and creative format**. Encourage each group to elect a presenter of a different gender for the presentation.

Presentations should include:

Source Description: Where was the water collected, and what did you observe at the site?

Test Results: Visual aids encouraged, use charts, sketches, maps, or photos

Encourage reflection:

- What does your data suggest about the water source?
- Were there visible signs of pollution?
- How do you think this affects wildlife and people?

Optional: Teams propose one realistic solution for improving water quality or raising community awareness, for example; a water-saving campaign, a filter prototype, a digital poster for local schools

Classroom activity 💡 (Optional):

Each student group will design an infographic or a short video (1–2 minutes) to advocate for clean water solutions based on their findings from the water quality investigation. This multimedia product should aim to raise awareness, educate their peers, and propose practical actions that their school or local community can take to improve water quality.

Note for the teacher 📝

Present 2–3 short case studies (you can show slides or tell them aloud) about indigenous and cultural wisdom in water protection:

Māori of New Zealand – Kaitiakitanga

- The Whanganui River was given legal personhood, meaning harming it is like harming a person.

Andean Communities in Peru – Amunas

- Ancient stone canals collect rainwater in wet season and recharge aquifers for dry seasons.

First Nations in Canada – Water Walkers

- Women-led ceremonies walk thousands of kilometers to raise awareness that water is sacred and must be protected.

“What can we learn from these approaches?”



 **Optional classroom activity:**

Each student group will design an infographic or a short video (1–2 minutes) to advocate for clean water solutions based on their findings from the water quality investigation. This multimedia product should aim to raise awareness, educate their peers, and propose practical actions that their school or local community can take to improve water quality.

CONCLUSION AND SHARING

Once the experiment is completed, some questions are posed for discussion among the groups and participants:

- How does water quality affect plants, animals, and humans?
- What can we do as a community to keep water clean?
- What did you learn about environmental science?
- If you had more time or tools, what else would you investigate?



Optional:

Post students infographics as a public awareness piece on school media.

Don't forget to take a photo of your experience and share it with us!



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[Instagram](#)



[X](#)