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OTTERS
Citizen Science for Water Stewardship

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How Citizen Science Empowers Water Stewardship

Stories from the EU Mission Ocean OTTERS project

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Citizen science has been growing

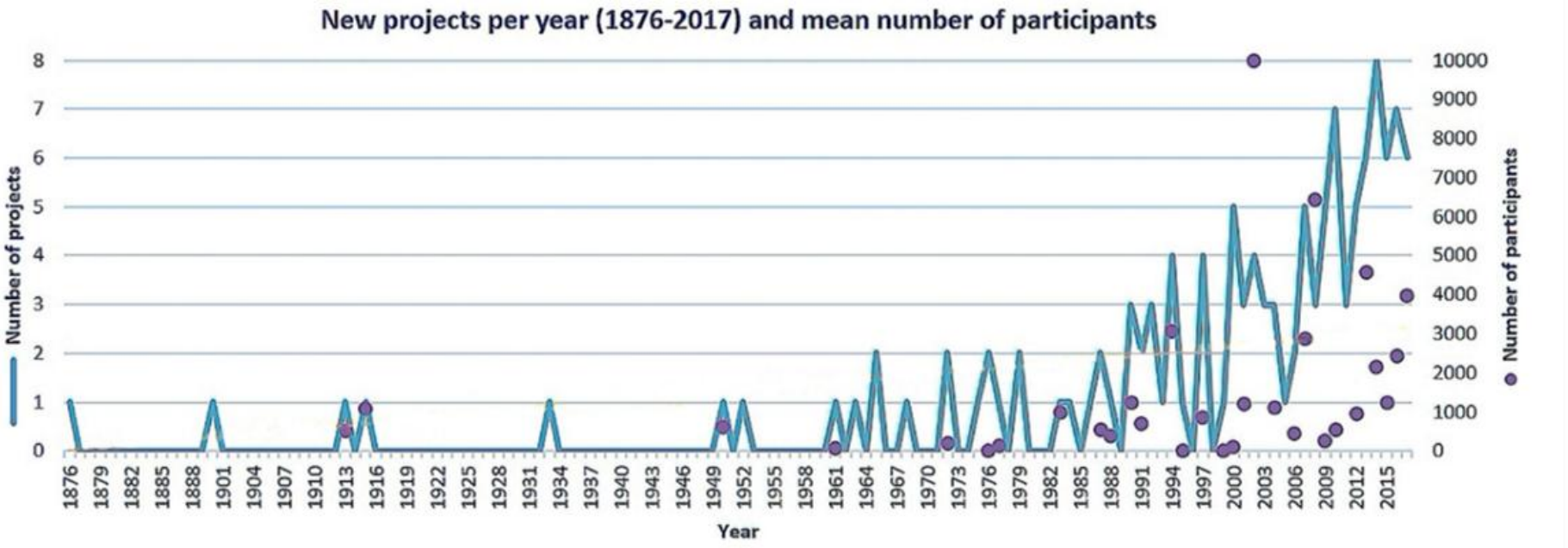

FIGURE 1 | Number of newly started marine citizen science projects in the North Sea and mean number of participants per project (from van Hee et al., 2020).

- **Diverse types of data being produced**
- **Complimentary to new, innovative approaches (***e.g.* used to validate remote sensing data, AI image identification, Data Lakes that feed to Digital Twins of the Ocean**)**
- **Commitment from policymakers**

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But there are also challenges

- ✖ **Small scale, fragmented**
- ✖ **Many methods and standards ≠ comparable**
- ✖ **Lack of trust in data quality**
- ✖ **Data not always used, sometimes lost**
- ✖ **Projects and efforts tend to die when funding is over.**
- ✖ **Demotivated citizens (**due to lack of impact, continuity, sustainability**)**

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Scaling up

- ✔ **Team up! Create larger, regional campaigns.**
- ✔ **Standardize!**
- ✔ **Accessible and easy-to follow guides**
- ✔ **Training and education**
- ✔ **Ensure the data can be used for research and policy**
- ✔ **Ensure the data flows in the right direction**
- ✔ **Develop water stewards!**

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Project name: Social Transformation for Water Stewardship through Scaling Up Citizen Science (OTTERS)
Funding: EU Horizon Europe; Coordination and Support Actions; grant agreement No 101094041
Project dates: 1 January 2023 – 30 June 2025 (30 months)
Amount: EURO 925,625

EU MISSIONS
RESTORE OUR OCEAN & WATERS

AUA ACOPIAN CENTER for the ENVIRONMENT
ecsa European Citizen Science Association
NUCLIO
CSGI
1865
Co-funded by the European Union
UNIVERSITY OF TWENTE.
אוניברסיטת חיפה University of Haifa جامعة حيفا
ELLINOGERMANIKI AGOGI
ECOCEAN
21c consultancy
AGORA PARTNERS

Cluster efforts and design Spring-to-Sea regional campaigns

Cluster similar efforts within watersheds to encourage joint efforts, data and experience sharing, regional awareness and aid scaling up of the data.

Change hearts and minds

Increase citizen awareness and ocean literacy, promote agency, and water stewardship

Promote best practices, common methods and standards

This will ensure data quality, accessibility, interoperability and exploitation for blue growth and policy setting and compliance.

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Standardization

Expert consultations

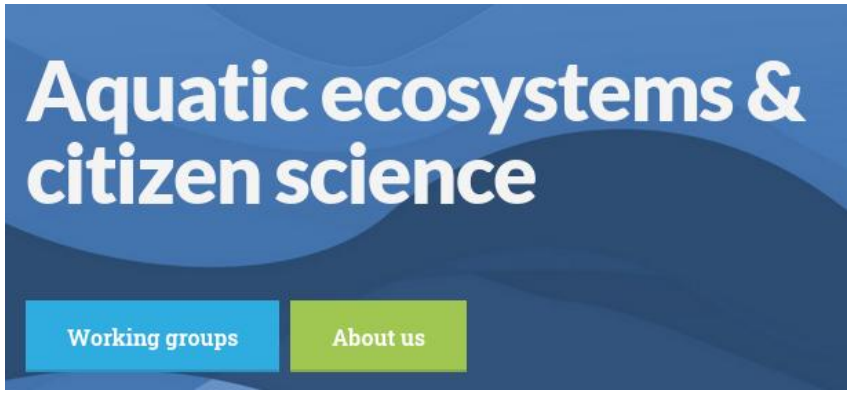
Workshops

Conferences

Desk research and inventory of CS projects

ECSA Working Group on Aquatic Citizen Science

ecsa European Citizen Science Association



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Workshops & webinars

Citizen engagement & water stewardship

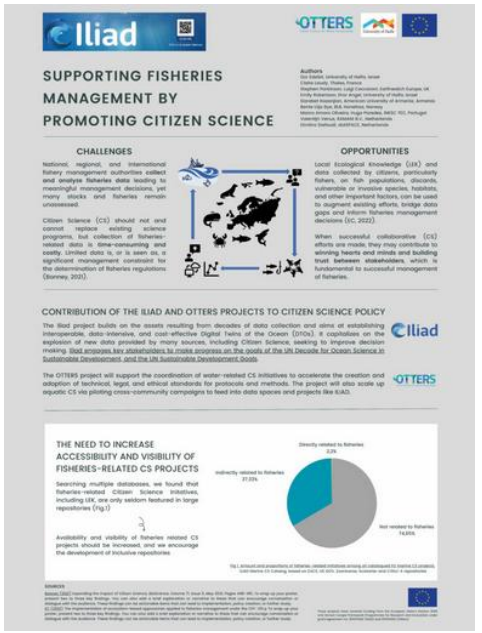
Challenges of using citizen-generated data for sustainability & policy advancement

Legal issues regarding citizen science in the water domain

Ethical issues with citizen science

State of the art of citizen science in the water domain

Posters & presentations



Supporting fisheries by promoting citizen science

Developing standards for citizen science

Publications

Integrating Citizen Science in Formal Education

This policy brief discusses the integration of citizen science (CS) into formal education, highlighting its potential to enhance learning and foster environmental stewardship.

The white paper presents findings from a study involving 333 teachers, which revealed that while citizen science offers significant educational benefits, its implementation is hindered by systemic barriers such as curriculum constraints, time limitations, and insufficient training.

The brief outlines a roadmap for integrating citizen science into formal education and provides policy recommendations to address these challenges and promote its effective adoption in schools.

The brief is based on the deliverable 4.1 – Roadmap towards integrating CS into school curricula and activities and creation of the OTTERS school hubs of the OTTERS project.

Download the Policy Brief

Citizen Science & Riparian Ecotone Management

Riparian zones are dynamic ecosystems integral to watercourses,shaped by flooding regimes that create diverse habitats with uniquebiotic communities adapted to high water and nutrient availability. Riparian vegetation is indispensable for maintaining the health ofriverine ecosystems and surrounding landscapes. They regulatefloods, control sediments, filter pollutants, stabilize microclimates,support aquatic food chains, and enhance habitat diversity.

This white paper entitled: Citizen Science and Riparian Ecotone Management, explain How can citizen scientists contribute to managing and monitoring riparian vegetation and biodiversity. Detailed analyses of relevant international and national scientific literature and databases are included in the full report.

Download the Executive Summary

Download the White Paper

Citizen Science and Freshwater Policy

Citizen science offers a promising way to improve citizens' awareness and aquatic literacy. It can also help to improve the quality of water quality data. By engaging in citizen science projects, individuals are more likely to adopt eco-friendly habits and become more engaged in their communities. Citizen science can also lead to better policies and environmental practices.

This technical brief explores the levers for a stronger collaboration between citizen science programmes and regulatory agencies to meet the goals of European and global water quality objectives, in particular WFD and SDG 6.3. The full report, including a thorough analysis of international and national scientific literature and databases.

Download the Executive Summary

Download the White Paper

Citizen science & Policy

We have published 3 white papers:

1. Citizen Science and Freshwater Policy
2. Citizen Science & Riparian Ecotone Management
3. Citizen Science as a Contributor to Marine Strategy

\+ A policy brief on integrating water-related citizen science in education.

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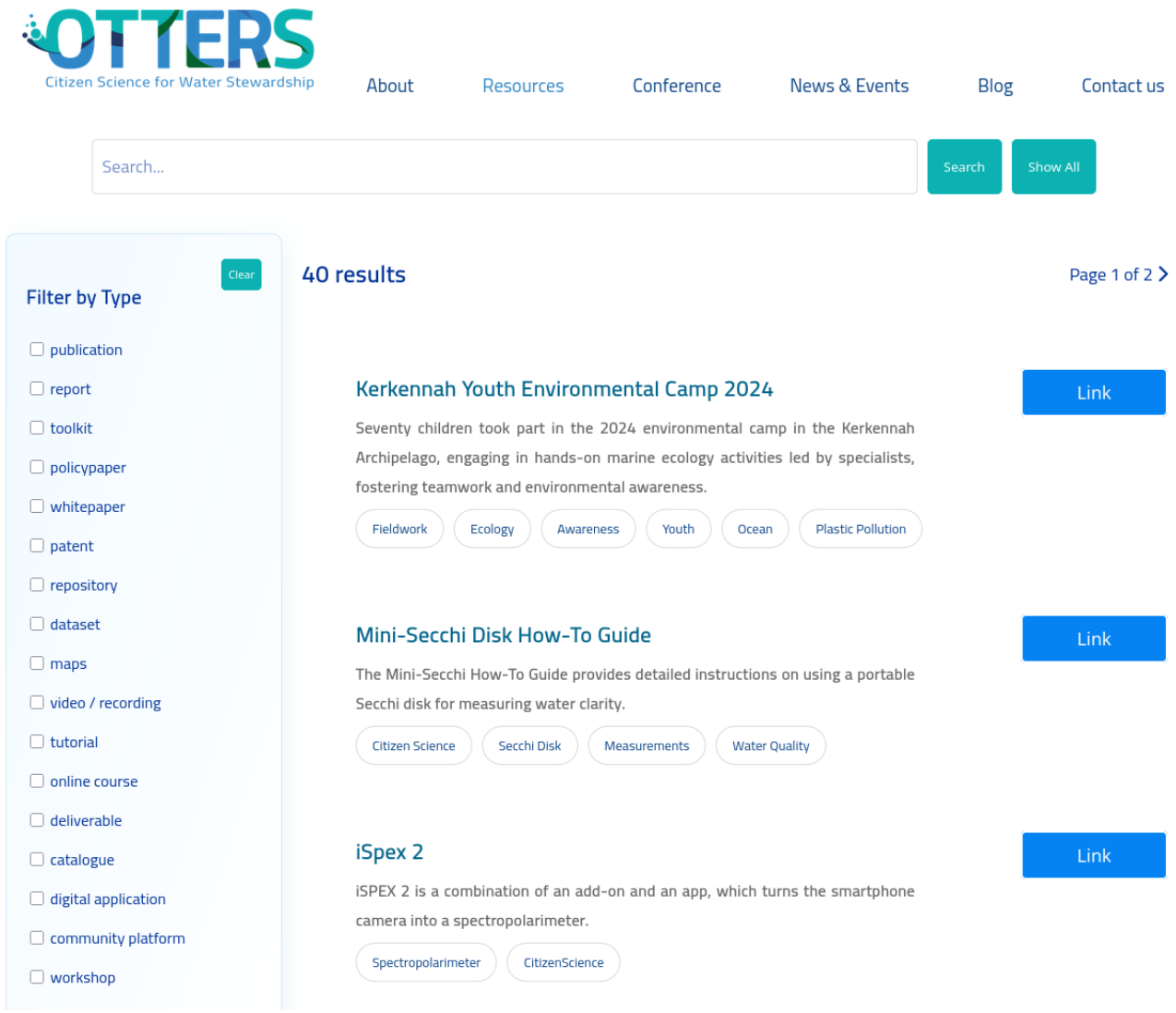
Citizen science Resource Hub



Where you can search and find water-related citizen science material:

- Guidebooks
- Toolkits
- Reports
- Publications
- Policy briefs

And you can contribute too by sending us links to materials you've published: shorturl.at/49KW7

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Spring to Sea Campaigns

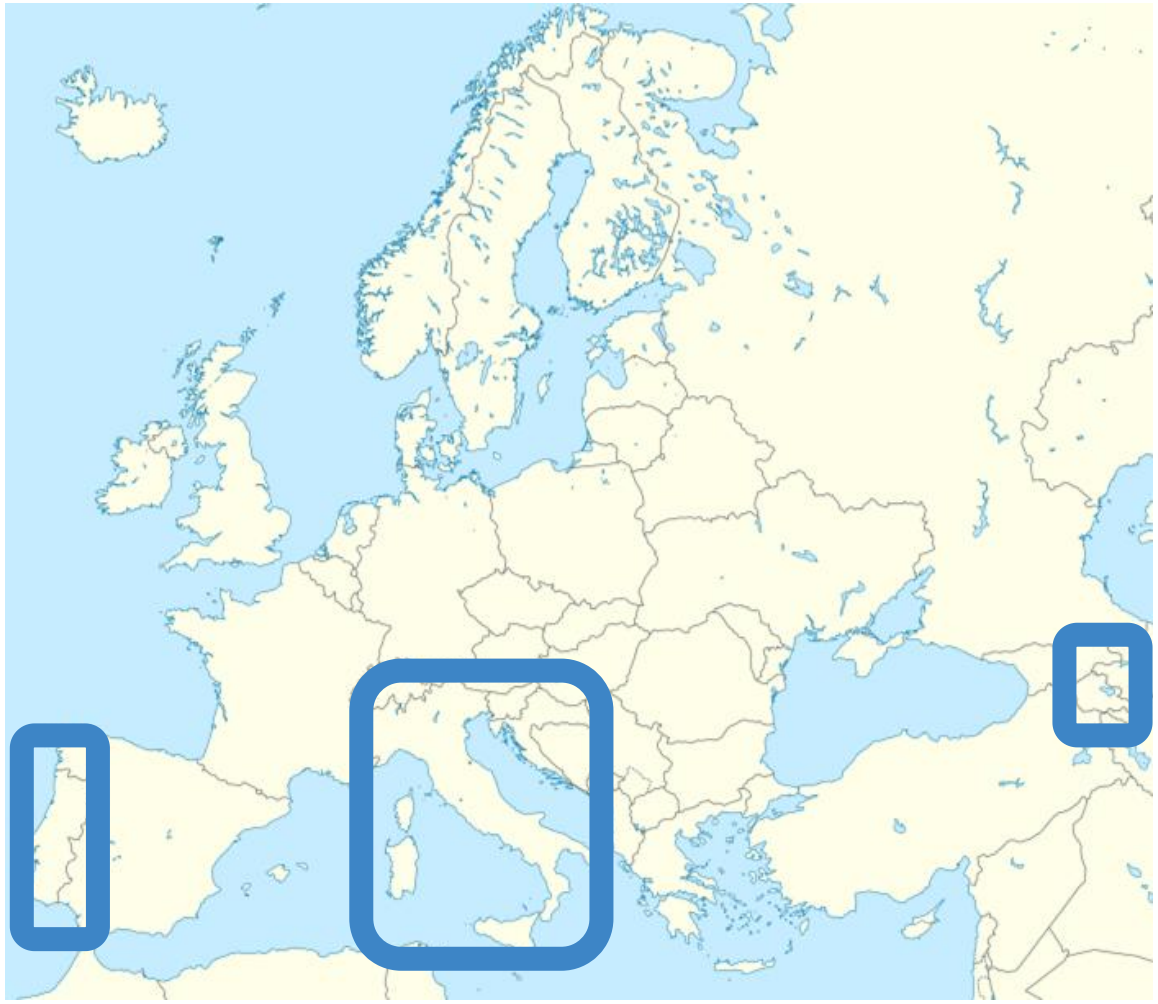
Cluster many ongoing-initiatives under umbrella campaigns that encompass the watershed

Co-design these campaigns with local groups, teachers, youth groups (+ detailed surveys with diverse stakeholders, n=330)

Three countries:
Portugal, Italy, and Armenia

Three different water-related topics
Clean beaches, floating litter, water quality

Develop a blueprint of best practices and guidelines to be replicated



Co-creation toolkits

Guides and visual aids to co-create regional campaigns based on common themes identified in our surveys.

Facilitate and promote the inclusion of best practices:

- community engagement
- fostering agency and action-driven agenda
- promoting water stewardship

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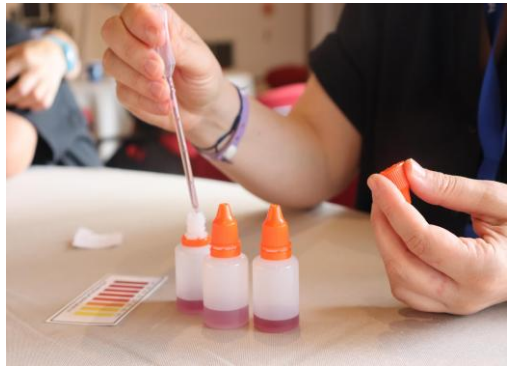
Education & Water Literacy

Organization of local and European workshops and training sessions (incl. 2 summer schools for educators)

- **How to use toolkits for water quality measurements**
- **Standards and best practices for data collection and sharing**
- **Ensuring data quality**
- **Development of toolkits and guidelines**
- **Guidance on data sharing and accessibility**
- **Helping the schools join the European Network of Blue Schools***

Network of European Blue Schools



* Certified European Blue Schools are eligible to receive grants from the EU4Ocean Coalition for Ocean Literacy's call 'Challenge of the Year' and from Mission projects ProBlue, SHORE and BlueLightS.

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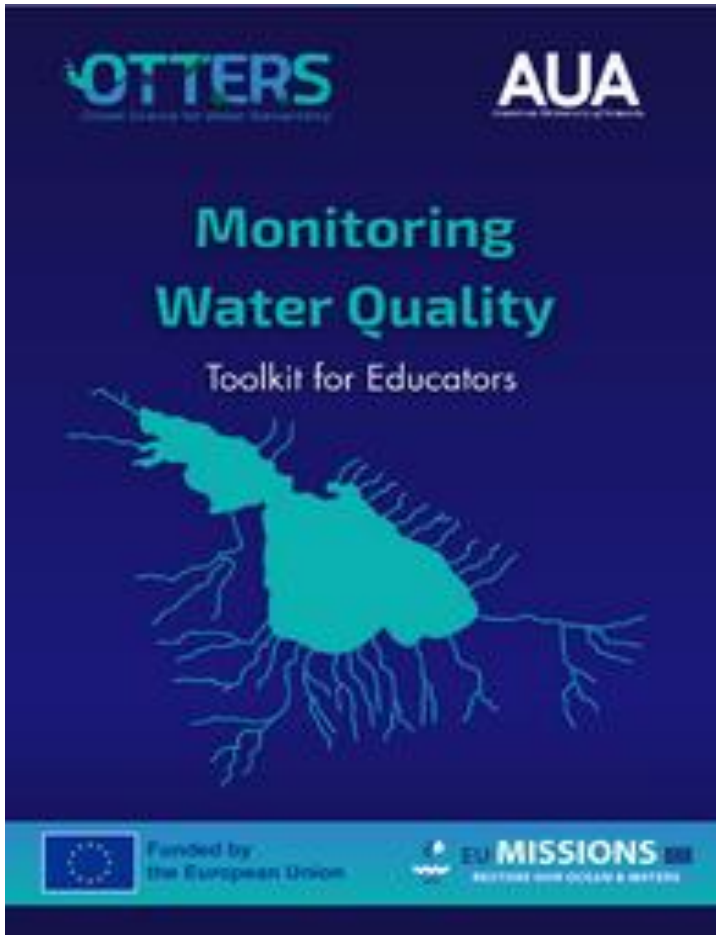
Education & Water Literacy



How to Measure Temperature, Turbidity, and Conductivity:

For these physical parameters, you can use a conductivity / TDS probe as seen in the picture below. TDS stands for Total Dissolved Solids and is an indicator of turbidity.

Instructions:

1. Calibrate the meter before going to the field (See below).
2. Remove the protective cap and immerse only the tip of the probe in the water.
3. Stir gently and wait for a stability tag to disappear.
4. Record the conductivity in mS/cm on the sheet.

Note: The reading on the display is expressed in: mS/cm or ppm. Make sure you have the right unit selected.

5. Record the temperature in °C.
6. After use, rinse the probe with clean water.
7. Make sure to add the protective cap again after use to avoid damages to the sensor.

3.2.2 Ammonia

Dissolved ammonia (NH_3) is a form of nitrogen found in water and is toxic to aquatic life at high concentrations. It commonly originates from decaying organic matter such as animal feces or municipal sewage and, as such, is used to assess pollution levels [28].

How to Measure Ammonia Using a Reagent:

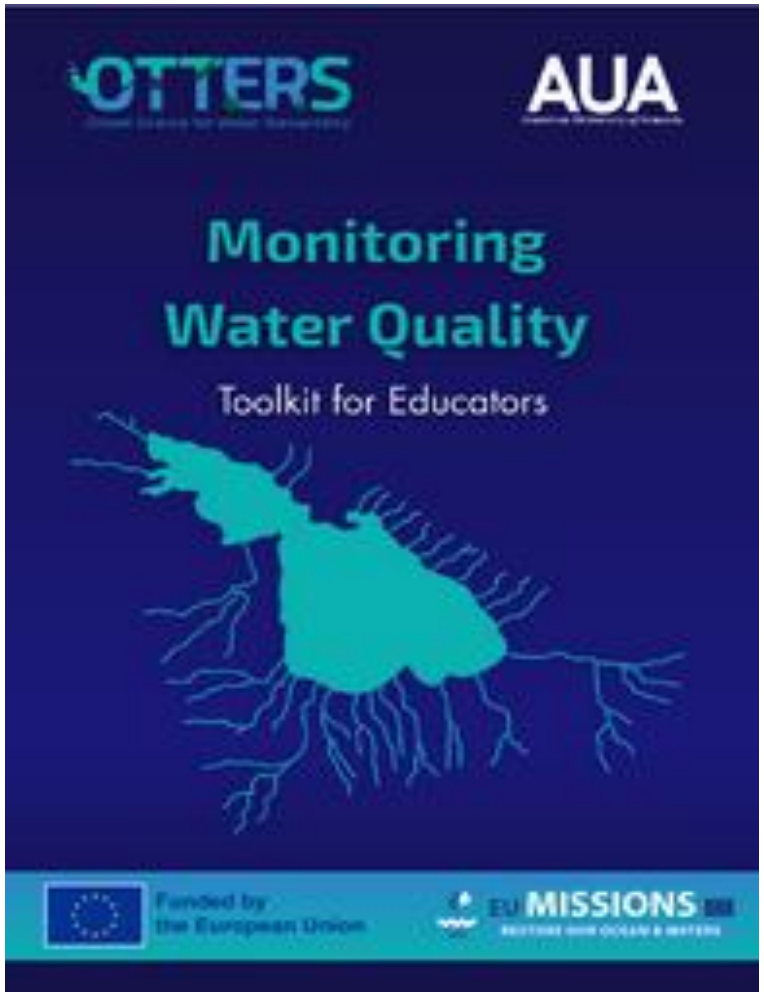
As above, we will use the API Freshwater Master Kit, which measures ammonia in parts per million (ppm), which is equivalent to milligrams per liter (mg/L) from 0 - 8 mg/L.

Instructions:

1. Fill a clean test tube with **5 ml of water** to be tested (to the line on the tube).
2. Add **8 drops** of the Ammonia Test **Solution #1**, holding the dropper bottle upside down in a completely vertical position.
3. Add **8 drops** of the Ammonia Test **Solution #2.**
4. Cap the test tube and shake vigorously for **5 seconds.**
5. Wait **5 minutes** for the colour to develop.
6. Compare the colour of the solution to the Ammonia Colour Chart in the kit. The closest match indicates the ammonia concentration in the water.
7. Rinse the test tube with clean water after use.

28. Don Spaeth, *"Ammonia in Your Fish Tank,"* Petco Animal Supplies. Inc., February 3, 2023, https://www.petco.com/content/content-hub/home/articlePages/health-wellness/ammonia-in-your-fish-tank.html.

Education & Water Literacy



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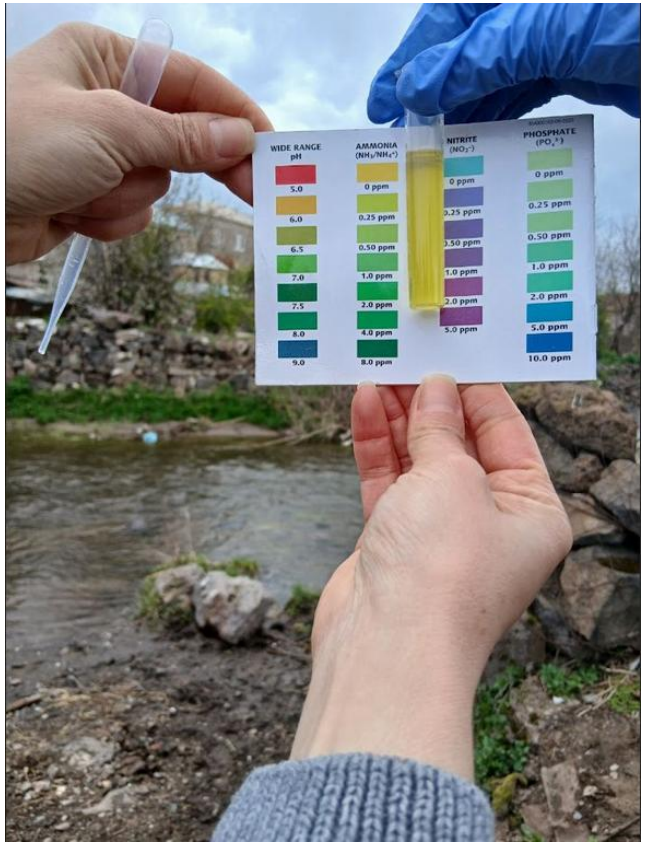
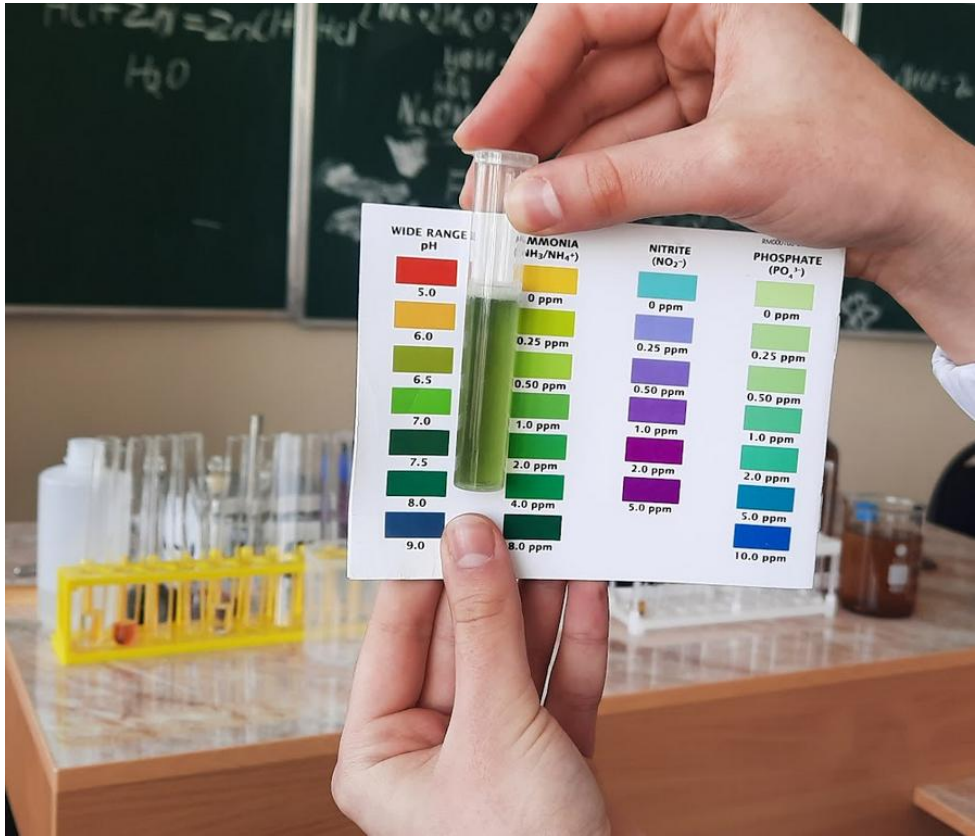
10 Schools around the Lake have joined

Each school has adopted a river

Supported to apply and win a grant from ProBleu

Weekly water quality measurements





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Water Stewardship

Results shared openly

Lessons are being integrated into school curricula

Students come together and present their results

Analyze results together, discussion with local community and regional authorities

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