Involving citizens in sensory evaluation of water.
Proposal for a pan-European citizen science exercise.

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WaterTOP

WaterTOP Editorial Meeting, 27-30 September 2021, Nafplio, Greece

Principles of Citizen Science

ecsa | European Citizen Science Association

Ten principles of citizen science

1. **Citizen science projects actively involve citizens in scientific endeavour that generates new knowledge or understanding. Citizens may act as contributors, collaborators, or as project leader and have a meaningful role in the project.**

2. **Citizen science projects have a genuine science outcome.** For example, answering a research question or informing conservation action, management decisions or environmental policy.

3. **Both the professional scientists and the citizen scientists benefit from taking part.** Benefits may include the publication of research outputs, learning opportunities, personal enjoyment, social benefits, satisfaction through contributing to scientific evidence e.g. to address local, national and international issues, and through that, the potential to influence policy.

4. **Citizen scientists may, if they wish, participate in multiple stages of the scientific process.** This may include developing the research question, designing the method, gathering and analysing data, and communicating the results.

5. **Citizen scientists receive feedback from the project.** For example, how their data are being used and what the research, policy or societal outcomes are.

6. **Citizen science is considered a research approach like any other, with limitations and biases that should be considered and controlled for.** However unlike traditional research approaches, citizen science provides opportunity for greater public engagement and democratisation of science.

7. **Citizen science project data and meta-data are made publicly available and where possible, results are published in an open access format.** Data sharing may occur during or after the project, unless there are security or privacy concerns that prevent this.

8. **Citizen scientists are acknowledged in project results and publications.**

9. **Citizen science programmes are evaluated for their scientific output, data quality, participant experience and wider societal or policy impact.**

10. **The leaders of citizen science projects take into consideration legal and ethical issues surrounding copyright, intellectual property, data sharing agreements, confidentiality, attribution, and the environmental impact of any activities.**

ECSA (European Citizen Science Association). 2015. Ten Principles of Citizen Science. Berlin. http://doi.org/10.17605/OSF.IO/XPR2N

Water-related Citizen Science projects (from eu-citizen.science)

Featured project

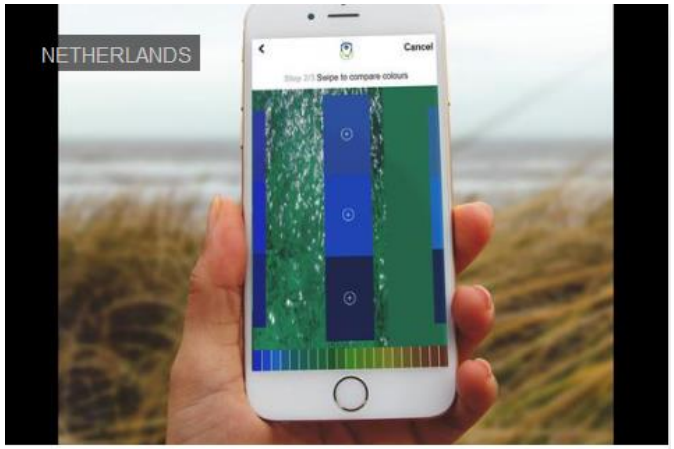
Citizen Drought Observatory

Project

Fresh Water Watch

Project

URwatair



Project

EyeOnWater

Project

CrowdWater

Project

Schools and Satellites

Sensory evaluation of drinking water in EU

EU 2015/2017 and EU 2020/2184 recast

Indicator parameters:
Taste and Odour : Acceptable to consumers and no abnormal change
Samples **spatially and temporary distributed.**

- **No method** is specified.
- **No parameter value** (limit) is specified.

Some labs use **Threshold Odour Number (TON)** – **Threshold Flavour Number (TFN)**,

Example: Athens Water (EYDAP SA), 4M consumers, 3500 samples/year, about 10 samples/day.

EUROPEAN STANDARD **EN 1622**
NORME EUROPÉENNE
EUROPÄISCHE NORM
August 2006

ICS 13.060.60 Supersedes EN 1622:1997

English Version

Water quality - Determination of the threshold odour number

4 Principle

The odour and flavour of a water sample are quantitatively assessed by a test panel by comparing that sample and/or dilutions of that sample with a reference water.

The odour and flavour of a water sample may also be assessed qualitatively by only one selected assessor or a test panel to detect any abnormal odour and/or flavour.

Limitations/drawbacks of TON/TFN

Quantitative testing:

- Need to have a **panel** of assessors.
- **Laborious** (prepare dilutions, testing protocols, results forms, statistics, qc samples).
- **Time** consuming.
- Need for sample preparation and testing **rooms**.
- **Uncertainty** of results (e.g. in interlaboratory trial a TON 3-20 may be accepted).
- **Interpretation** of results (no parameter value established in EU).
- Choice of **"reference" water** may affect interpretation.
- No information about the **character of the smell/taste**.

Qualitative testing:

- Relies on **only one** assessor.
- Fatigue, adaptation, **routine work** (carelessness, negligence, absenteeism…).

Both methods: Are they **relevant to consumer acceptance?**

Conceptualization

- Consumers have the sensors for sensory evaluation of water (nose/tongue).
- Consumers evaluate tap water every time they drink, but we get no feedback from this evaluation.
- We could involve consumers in taste/odor evaluation of tap water.

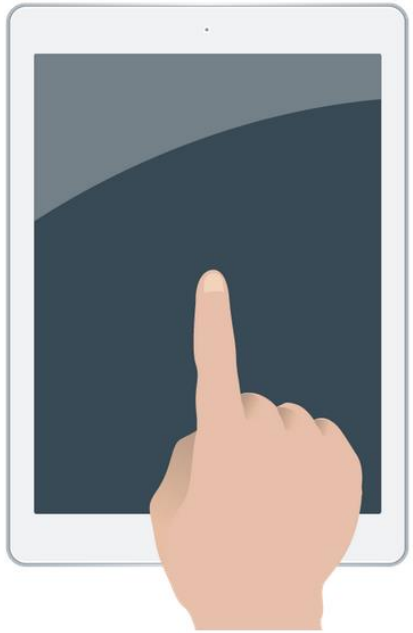
Benefits for water supplies:

- **Real-time** acquisition of data from consumers, that would be **relevant** to “consumer acceptance”.
- Data serving as **“early warning”** for T&O incidents, faster than complaints.
- Data **distributed in space and time**.
- **No need for sampling** campaigns.
- **No need for laboratory equipment, personnel and facilities.**
- **Citizen science** benefits.
- **Social responsibility**.
- Bonding with consumers and local communities, improving the **“image”** of water supplies.

Process

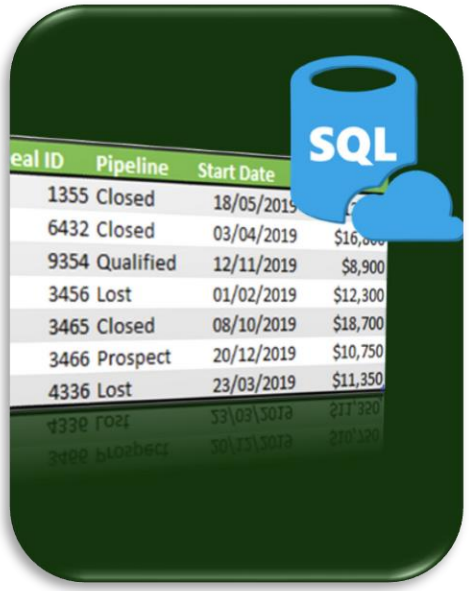
Consumers drink water as they regularly do in their premises.

Relevance to consumer acceptance.



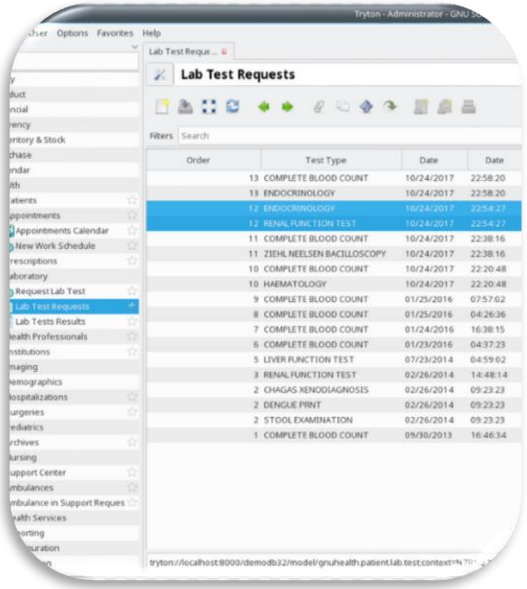
With a simple mobile app they enter results by tapping a single button.

Simple, takes 10s. Optional GPS for multiple locations.



All data are transferred in real-time to a water supplier's database

Real-time alerts (emails, sms), meta-analysis etc.



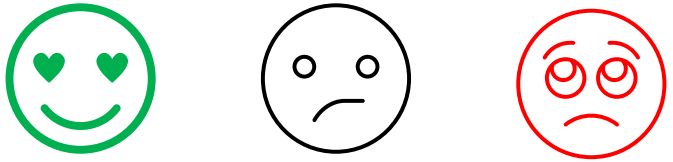
Data can be synchronized to LIMS if needed

Integration with other laboratory data on water quality.

Features

Consumers:
- Voluntary basis.
- Pilot scale: Employees of water supplier (bias?).
- Full scale: Recruitment in academia (students), or general public (how?)

Scale and data:
- Simple 3-level scale buttons.
- Optional text (description of odor).
- Date/time automatically included.
- Location predetermined or GPS.



App:
- IOS and android
- Registration (once)
- Simple page with instructions
- Pilot scale: google forms to google spreadsheet (no need for coding)
- Full scale: simple but attractive

Features

Consumers' motivation ideas

- Webinar about water T&O
- Open day in water supplies (guided visit to WTPs, labs)
- Certificates awarded by water supplier.
- Gift card as a recognition for their contribution
- Acknowledgement in website (names)
- "Drink water" reminders in app

Gamification

- Collect points with each evaluation, "game design" in app.
- Names of "champions" visible in the app.
- Small gift to champions (e.g gift card).

Needs

- ECSA consultation (mentioned in WaterTOP MoU).
- Coordination within WaterTOP (we need people, especially ECIs)
- Recruitment of water supplies in EU (Eureau, WaterEurope, locally, MC members)
- App development (can be funded from WaterTOP?)
- Pilot stage (e.g. 3 water suppliers using employees – 6 month?)
- Full deployment
- Publicize the project and results

We need your ideas and suggestions !