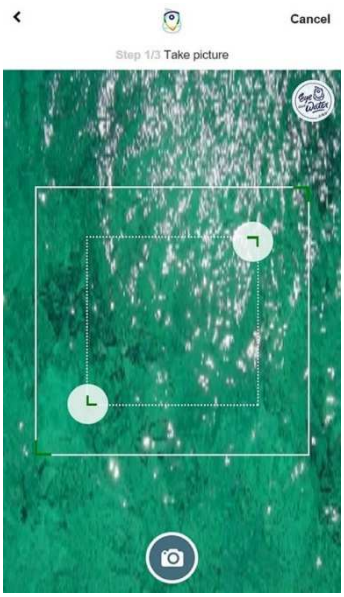
EyeonWater: Advancing in adopting citizen science for water quality monitoring

Peter Thijsse, MARIS (Netherlands), peter@maris.nl
Hans van der Woerd, VU Amsterdam, h.j.vander.woerd@vu.nl

Short background

People have always been interested in observing their surroundings. Whereas costly observation satellites and in-situ measuring stations are set up to monitor vast areas of ocean coastlines, this can now be complemented more and more by observations carried out by citizens. The data will be used by scientists (oceanographers, limnologists) and water authorities for statistical and long-term water quality analysis in conjunction with e.g. climate research. For an optimised result and involvement of the citizen a feedback loop with results will need to be created.

The concept of EyeOnWater



Water quality of natural waters can be estimated via their colour and transparency, since these optical properties are affected by the substances that are either suspended or dissolved in it. The EOW Colour App facilitates the monitoring of colour changes of natural waters around you. The App was developed within the EU FP7 - Citclops consortium to estimate the colour of water bodies by citizens. The App is based on an old oceanographic colour standard, the Forel-Ule (FU) scale. The colour of the waterbody is compared with 21 on-screen colour bars, additionally images are also processing automatically on the server.

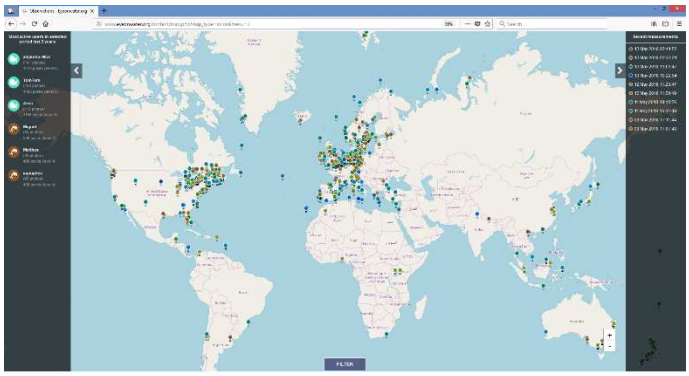
The app can be found in the IOS and Android stores:

https://itunes.apple.com/us/app/eyeonwater-colour/id1021542366?mt=8

https://play.google.com/store/apps/details?id=nl.maris.citclops.crosswalk

The observations from the app are sent to the server. The data concerns the image taken, the FU-index as marked by the user and a set of metadata: location, date/time, device type, angle, azimuth angle, installation ID etc. All data and metadata is stored in a database immediately at import. Incoming data is validated by running an algorithm on the image extracting RGB values and thereby processing an automatic FU index value. This can be compared to the user value and sets a quality flag.

The central EyeOnWater website www.eyeonwater.org has three main functions:



- The website provides app users a personal experience and shows all observations to all interested.
- Validation by users: Users can check other observations (e.g. around their own) and flag them if they are of insufficient quality.
- Data access services:

- OGC compliant WMS and WFS service to serve out data to other systems
- A search and download service for manual access to the data and metadata.

Current developments and possible extensions and use cases

The IMDIS presentation will report on the concept and especially on the following interesting projects and lessons learnt.

EyeOnWater Australia: CSIRO in Australia has started the EyeOnwater Australia project. The original EOW app and services are updated and extended. The data from citizen scientists will be used to improve interpretation of satellite data. Students are using the Eye on Water app to assess the water colour using the Forel-Ule scale. Students also use a chemical backpack to make physical and chemical measurements in their environments as part of a year 9 & 10 biodiversity and ecology unit, and the backpack will also be handed out to ranger in Northern Australia. All data is collected via the app. Via the kit the following parameters are measured: Temperature, pH, Conductivity, and later via lab processing a.o. ammonia, CO2, Nitrate, etc. The Australian version of the app is freely available and records all measurements in a national database.

In the Netherlands there are two varieties/spin-offs of the EOW App released:

- Monitoring biodiversity in Dutch polder canals via a set of indicator flora. Dutch farmers are involved in a project to fertilise their lands, and maintain their canals in a different way to increase biodiversity. The app supports monitoring progress.
- Monitoring waterplant nuisance for sailors. Large Dutch waters tend to have large quantities of waterplants that hinder sailors. Government maintains the waterways but dynamics of the plants are high, the sailors can now send alerts of dense areas that will trigger maintenance actions from government.

There is a high potential for near-future extensions. Internationally there is large interest for the EOW App + backpack option. But there is also a request for local applications aimed at education and water quality awareness raising by Dutch Water authorities, while cooperating closely with nature voluteers, recreational fishermen, etc. Integration and use of water quality citizen science data seems to be only just starting, but the use cases are almost endless.

The key to success is making the connection to both the volunteer (citizen, student) and to the user of the data. In the ideal case there should be a win-win for both: Data for the research organisation, improved exposure, data and water awareness for the water authority, knowledge, education or problem fixing for the citizen.