The EyeOnWater concept: Marine observations via participative science

Peter Thijsse, MARIS (The Netherlands), peter@maris.nl
Marcel Wernand, NIOZ (The Netherlands), marcel.wernand@nioz.nl
Hans van der Woerd, VU Amsterdam (The Netherlands), h.j.vander.woerd@vu.nl

EyeOnWater

The EyeOnWater (EOW) website and adjacent colour App helps to assess the colour of natural waters. The App was developed within the FP7 EU-Citclops consortium to estimate the colour of water bodies by citizens via an old oceanographic colour standard, the Forel-Ule (FU) scale. The colour of the waterbody is compared with 21 on-screen colour bars.

Smartphones are nowadays everywhere. Expensive observation satellites and in-situ measuring stations can now be complemented by low-cost EOW colour observations carried out by citizens. Data will be used by scientists (oceanographers, limnologists) and water authorities for statistical and long-term analysis in conjunction with climate research.

The Eyeonwater website www.eyeonwater.org and app (IOS and Android) have been launched end 2015. This presentation focusses on the implementation of the app, validation and the possible use of the data.
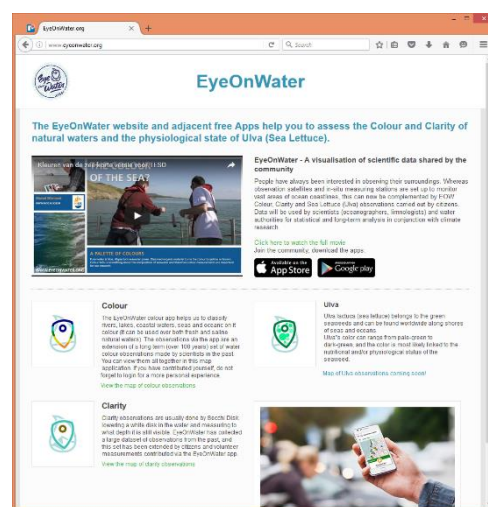

Fig. 1: Eyeonwater homepage

How does it work ?

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 App facilitates the monitoring of colour changes of natural waters around you. The App was developed within the EU-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.

The user takes a picture of the observed water surface, sun in the back, shining over one of the shoulders, then zooms-in at the part of the image that resembles the observed water colour best. The FU scale is then displayed on-screen and the user has colour-match and pick one of the coloured bars resembling the colour of the water (either by comparing the picture just taken or by looking at the water surface directly). When a colour is matched the SEND screen appears, showing your position and data can be uploaded to the EOW portal pressing SEND (data transfer only in reach of Wi-Fi).
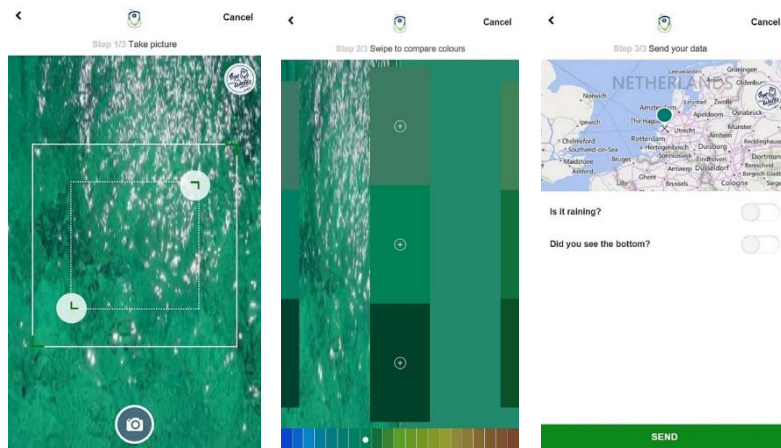
Fig. 2: Use of the EyeOnWater app : zoom, select, send

Once the data is uploaded to the EOW portal one can create a user-account and sign-in at www.eyeonwater.org to look at the data. Once clicked on a data point info will show-up containing meta data, the FU colour-match and the FU calculated from the zoomed image (in expert mode also MFU). You can compare with:

i) Previously uploaded data, near-by data by others
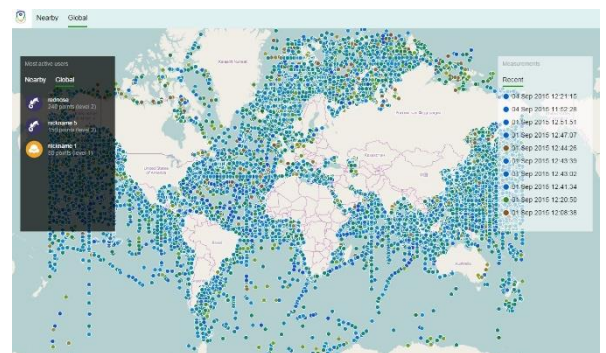
ii) Historic data (1890 – 2000), over 200,000 observations

Fig. 3: Compare to historical measurements

Scientific value of Eyeonwater data

Citizen data is various in quality and should not be used and distributed to wider community without validation. We will present the innovative methods how EOW data is validated and standardised.

The observations from the app are sent to the server and stored. The data concerns the image taken, the FU-index as marked by the user, and a set of metadata important for quality assessment: location, date/time, device type, angle, azimuth angle, installation ID etc.

EOW validates incoming data in two ways:

- Innovative algorithms were developed and published in the scientific literature to retrieve the colour index from the images taken with the App. We will present the results of these algorithms and how they can be used for quality control of the colour information provided by the App user.

- All app observations are visible on the Eyeonwater website. Other citizens are involved to correct each other. Users can flag a certain observation as "possibly not ok", and a message is sent to an expert who has the final verdict. Simple but strong.

We will present the steps taken to fit this type of data seamlessly in the stream of data collected by operational coastal monitoring stations (a.o making use of OGC INSPIRE compliant services and INSPIRE compliant marine standards provided by SeaDataNet/EMODNet).

Currently actions are undertaken to expand the EyeOnWater concept to other parameters, and make a connection to water management organisations for uptake of the dataand validation in actual use cases.