MONOCLE
Multiscale Observation Networks for Optical monitoring of Coastal waters, Lakes and Estuaries

May 2019

# Citizen Science

## What is citizen science?

Citizen science is a collaboration between scientists and volunteers or 'citizens' where individuals or communities get involved in scientific activities such as data collection and monitoring programmes, generating new knowledge or understanding to achieve a real scientific outcome.

Both professional and citizen scientists benefit from taking part. These benefits include increased research outputs, learning opportunities, personal development, increased sense of belonging, satisfaction from contribution to science, and addressing local, national, and international issues.

## Why is it important?

Citizen science programmes can offer opportunities for citizen scientists to participate in multiple stages of the scientific process, such as identifying the research question, designing the method, gathering and analysing data, and communicating the results. Many programmes provide volunteers with feedback about how their data are being used and what the research, policy or societal outcomes are.

Citizen science data are usually made publicly available and where possible, published in an open access format. It is important to evaluate programmes for scientific robustness, data quality, participant experience and wider societal or policy impact and take into account any limitations or potential biases. Legal or ethical issues related to copyright, intellectual property, data sharing, confidentiality, attribution and environmental impact all need to considered when designing a programme.

## How are we doing it in MONOCLE?

MONOCLE is an EU-funded research project developing water quality observation solutions using satellites, buoys, ships, and hand-held devices. These range from highly accurate automated systems to low-cost sensor solutions that can be built and operated by citizens.

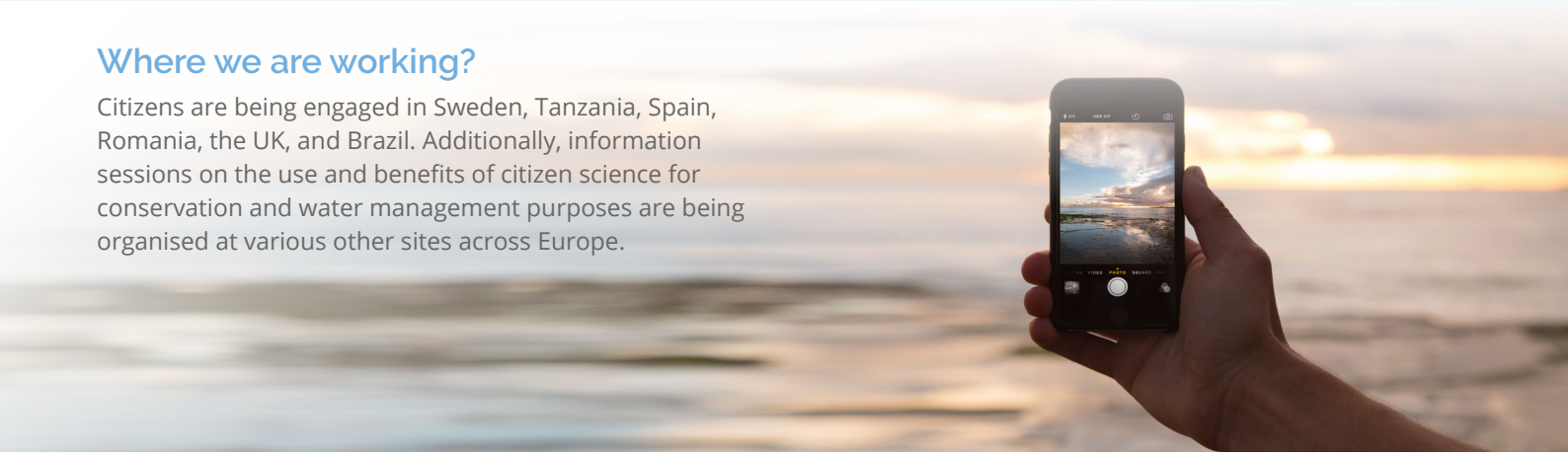
Alongside our research programme we are exploring the role that local communities and volunteers can play in collecting essential environmental data to complement existing monitoring networks, evaluate performance of *in situ* sensors and assist with the maintenance and deployment of sensors.

Modern technologies mean that it is easier than ever for citizens to engage in scientific endeavours. MONOCLE will use a wide range of devices and techniques, social media and novel applications to collect much needed data for researchers and organisations such as environmental charities and NGOs. It will also enable citizens to take an active part in monitoring their local environment.

MONOCLE will evaluate the role citizens can play in an integrated observation platform of *in situ* autonomous and citizen-operated sensors and earth observation services to monitor water quality in rivers, lakes, reservoirs, estuaries, bays and other coastal zones around the world.

## Where we are working?

Citizens are being engaged in Sweden, Tanzania, Spain, Romania, the UK, and Brazil. Additionally, information sessions on the use and benefits of citizen science for conservation and water management purposes are being organised at various other sites across Europe.



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www.monocle-h2020.eu

## MONOCLE supports these citizen science initiatives

FreshWaterWatch

FreshWater Watch is a global project investigating the health of the world's freshwater ecosystems.

It combines an online portal and a mobile app, with collected data visualised in real time.

The FreshWater Watch team in MONOCLE are exploring new microbiological and optical instruments to increase citizen scientists' capacity to monitor water quality.

iSPEX is a low-cost, mass producible add-on for smartphones with a corresponding app to measure air quality using a novel spectropolarimetric approach.

The iSPEX team in MONOCLE are upgrading the smartphone sensor capabilities to monitor the optical properties of water quality.

### KdUINO

KdUINO is a low-cost device to measure water transparency which is currently being upgraded to gather information in different colour bands.

A key challenge for KdUINO team in MONOCLE is to increase the number of volunteers to deploy units in a broad range of locations. To support this, a DIY version called the KduStick has been developed, with a reduced weight and increased portability to improve usability.

## The outcomes

The project outcomes include solutions for water quality monitoring based on the integration of sensors developed during the project with new and ongoing citizen science solutions and methods. These integrated solutions bring together different platforms in operational conditions, to optimize the cost-efficiency of *in situ* sensing, and to encourage participation by end-users.


Different training approaches (on-site and online) have been developed to use the sensors, solutions, and maintenance protocols developed in MONOCLE. These standardized protocols for citizen science projects will help to establish monitoring infrastructures of optical water quality in citizens' local areas.

## Societal benefits

Through citizen science, MONOCLE is empowering people to join the future of environmental management, in particular, management of our aquatic ecosystems. The citizen science methodology has the advantage of reaching isolated areas and communities, such as rural regions, where monitoring infrastructure may be limited.

The citizen science protocols developed in MONOCLE will be especially beneficial in regions where communities are aware of the necessity of water quality monitoring, but the resources available for implementation are low. These protocols can also provide benefits to educational institutions and organisations dealing with citizen engagement and empowerment based on local knowledge.

Finally, the integrated approach of the MONOCLE data infrastructure uniquely allows websites and mobile apps to offer a more complete understanding of the environmental to a range of stakeholders.

## Visit www.monocle-h2020.eu for more information or to get involved with our citizen science programme

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This factsheet was produced by PML, Water Insight, Peak Design and University of Leiden.
Check out the work they and other organisations are doing in MONOCLE at www.monocle-h2020.eu.

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