Article, Published Version

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Editorial

Hydrolink

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EDITORIAL

The term citizen science is broadly used to describe the engagement and participation of members of the general public in different aspects of scientific research such as data collection or processing. The last thirty years have seen an increasing use of the concept of citizen science in many fields of research ranging from astronomy to environmental science. Almost every week there are stories in the news about various citizen science projects. For example looking at the news from early December 2022, we find a story about volunteer amateur astronomers comparing images of the sky from the 1950's and today to determine whether some objects have vanished over the last 70 years; a project in Kangaroo Island in South Australia engaging tourists and locals in collecting data on koala behavior and observations on bee activities; plans for citizen science butterfly monitoring projects in New Hampshire to provide information on habitat needs and associated risks, timing of life cycles, and species range shifts over time; a citizen science project funded by the National Aeronautics and Space Administration of the United States to capture photos of sprites and other optical phenomena that flash above thunderclouds after a lightning strike.

A growing number of citizen science projects have been supporting hydrologic and water resources studies. The number of published papers on such projects has been growing exponentially over the last twenty years. This issue of Hydrolink includes five papers discussing different aspects of using citizen science in hydro-environmental and water resources studies.

The first of these articles, by Wouter Buytaert, presents an introduction to the different types of citizen science projects based on the level of and nature of citizen involvement in them, ranging progressively to greater engagement from simple data collection to their interpretation, problem definition and analysis. The article discusses the importance of creating partnerships that would enhance transparency to ensure that the knowledge generated by citizen science projects will be used in decision making. It also discusses the conditions for ensuring the sustainability of citizen science projects and the importance of embracing local knowledge.

The article by Pan Yang, Geng Niu, Erhu Du, and Yi Zheng discusses different aspects of weather data collected by citizens and other public sources, especially in the context of urban hydrology. This includes data from personal weather stations, surveillance cameras, social media and sensors in portable devices, vehicles, mobile phones, smart home equipment, and telecommunication infrastructure. Quality control of large-volume data coming from diverse sources has been recently facilitated by machine learning methods. An interesting observation made in this article is that stormwater management models using high density crowdsourced rainfall data can provide more accurate estimates of rainfall intensity than models based only on more sparse conventional meteorological station data.

Closely related to citizen science is the concept of community observatories introduced in the European Union a few years ago, aiming at developing community-based environmental monitoring with innovative and novel earth observation applications and combining it with monitoring by policy makers, scientists and other stakeholders. The article by Ioana Popescu presents a case of using community observatories for the collection of data to support flood modelling in a wetland of important ecological value located in the upstream central part of the River Danube Delta. In this case the crowdsourced data complemented data from conventional monitoring programs and the results of a numerical hydraulic model of the wetland, improving this way the ability to manage this part of the delta.

An article by Rick Battarbee describes a citizen science project in the River Wharfe in Ilkley in the United Kingdom, where coliform contamination by the discharge of untreated sewage was a health hazard for people bathing in the river. The project engaged local citizens in the collection of water quality samples and mobilized them in a campaign that raised awareness about the problem and drew the attention of regulators, leading to the designation by the UK Government of that part of the river as an official bathing site, which would require regular monitoring by the UK Environment Agency. The same project helped also identify agricultural activities as an additional source of faecal bacteria in the river.

Citizen science projects can be used to engage schoolchildren, contributing this way to their environmental education. Such an example is the project for the environmental restoration of the Osonoigawa Brook, part of an urban waterway in Tokyo described in the article by Takehiro Watanabe, Takizawa Kyohei, Nakamura Shinichiro, Satoquo Seino, and Yukihiro Shimatani. An elementary school adjacent to this waterway developed a river-centered environmental curriculum, which included water quality testing, biological surveys, and lessons by local experts and university researchers. Fifth and sixth grade students were asked to draw their design ideas for the waterway, which were submitted to the local mayor who accepted their proposal. This together with input from local citizens in a series of workshops formed the basis for the design of the restoration of the brook.

The articles in this issue of Hydrolink highlight only a few of the possibilities offered by engaging ordinary citizens and various stakeholders in the collection, interpretation, analysis and use of data supporting water resources and environmental decisions. The growing literature on citizen science offers many more such examples. Key challenges are the issue of how to motivate wider citizen participation in science projects and how to ensure data quality. More innovation should be encouraged in this direction. In addition, greater use of AI tools and methods can help deal with the challenges of data collection, cleaning, and analysis in the foreseeable future.