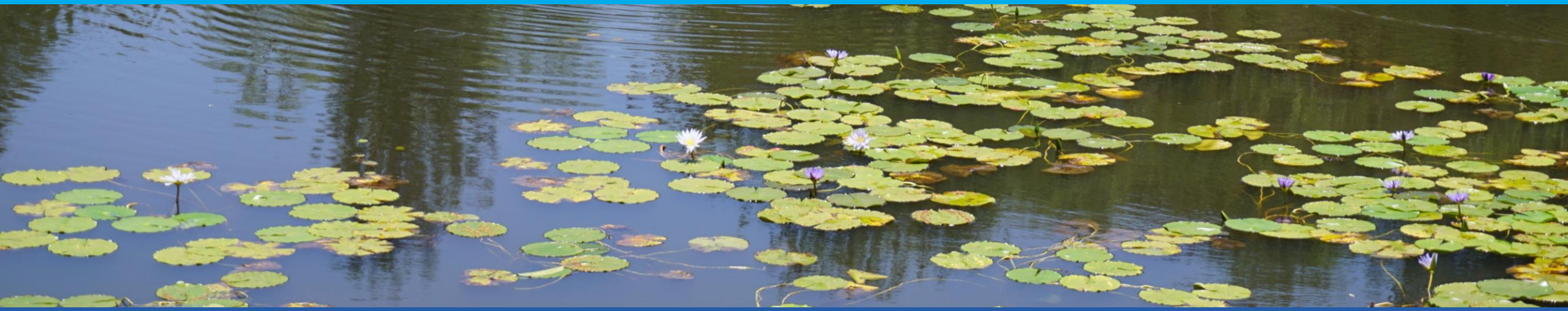
Citizen Science for water resources management in the context of the SDGs



Dr Deborah V Chapman

Founder and ex-Director of the UNEP GEMS/Water Capacity Development Centre

Environmental Research Institute, University College Cork

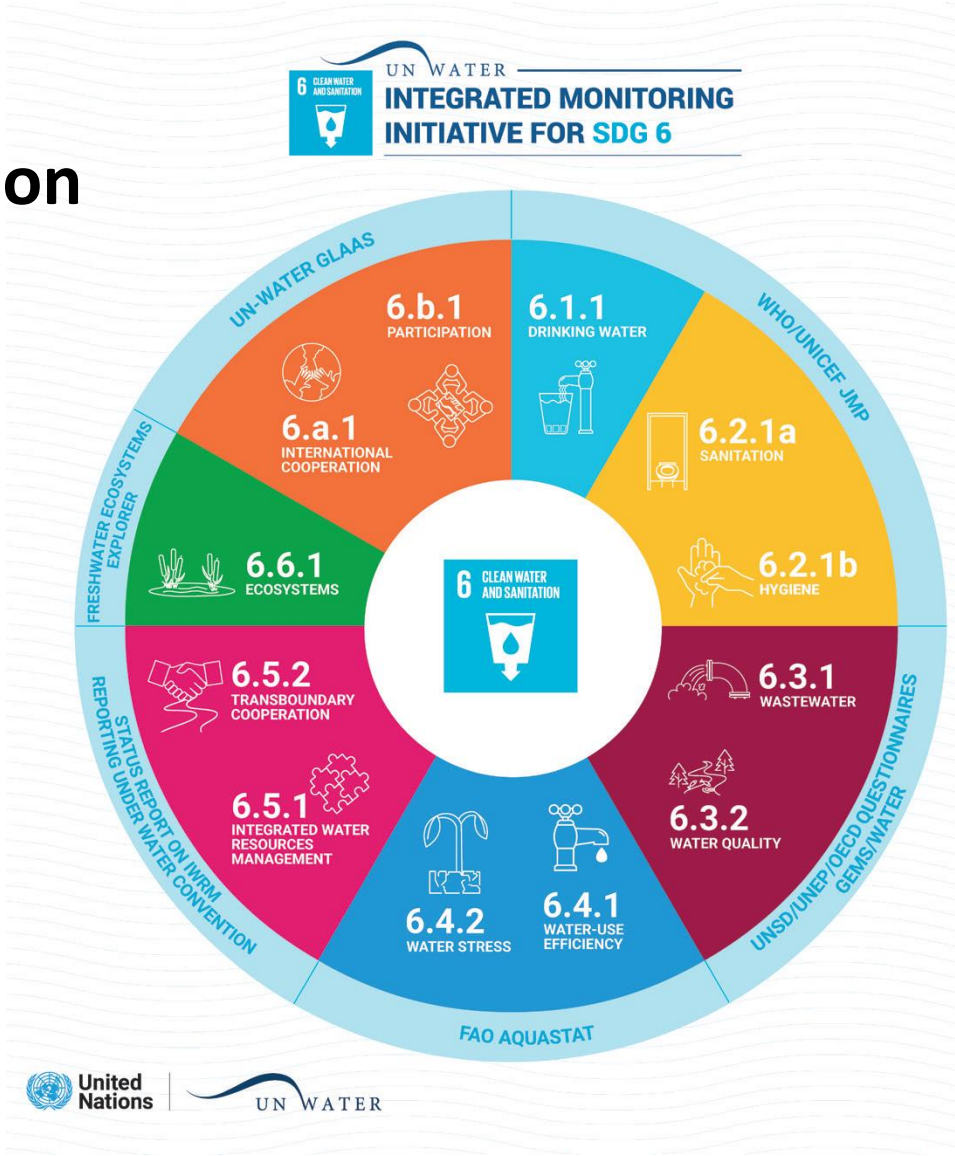
Water-ForCE, October 2022

SDG 6 – Targets on eight different aspects of freshwater resources

Ensure availability and sustainable management of water and sanitation for all

Eight targets and 11 indicators

Target 6.3: "**By 2030, improve water quality** by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally"



SDG Indicator 6.3.2: Proportion of bodies of water with good ambient water quality

Challenges for the global methodology:

- Feasible for all nations worldwide
- Minimal additional monitoring burden for countries
- Meaningful and comparable data

National governments collect the data, calculate the indicator using five basic measurements (N, P, O_2, pH, salinity) and report the indicator value to UNEP for quality checking and onward transmission to the UN Statistical Division

Level 1 national indicator value is the proportion of water bodies assessed that achieve 80% compliance with the national target values over the period of assessment

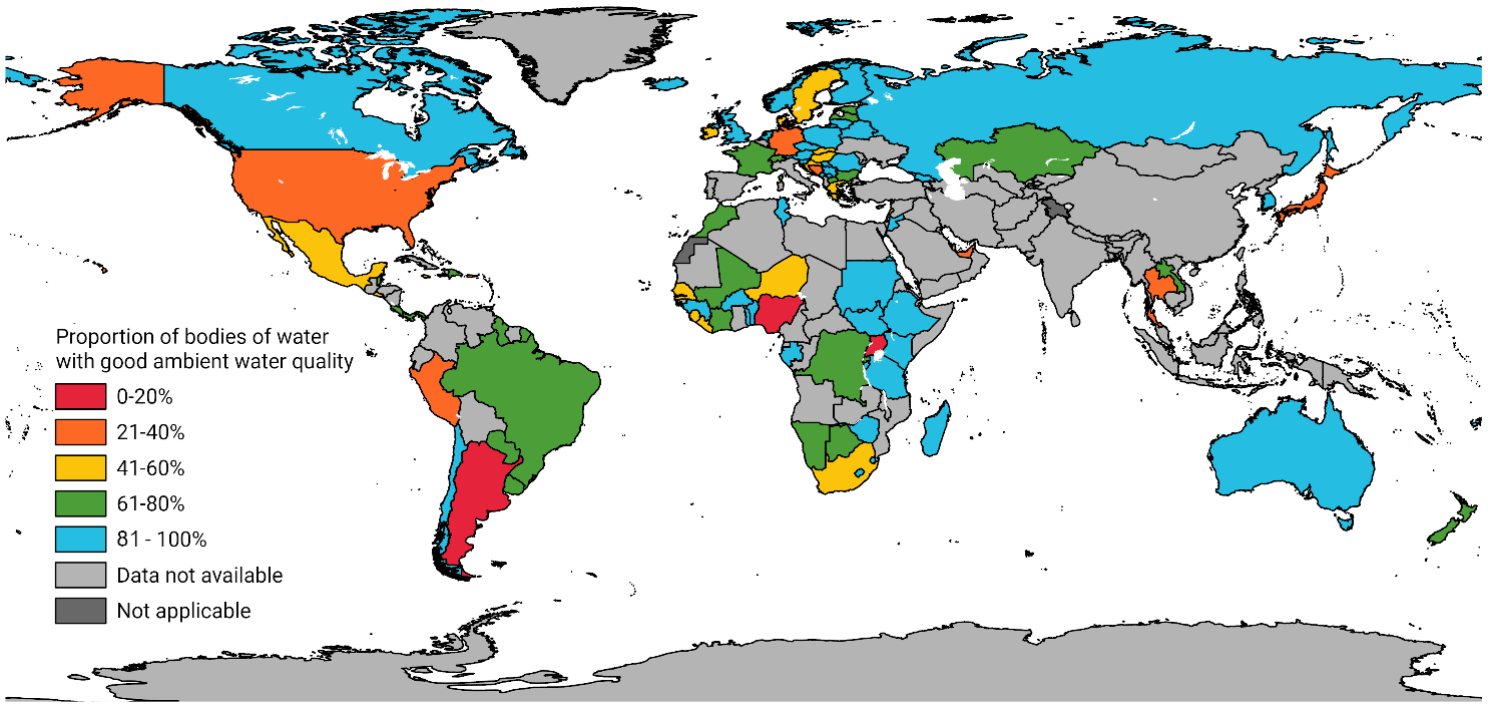
LEVEL 1

In situ measurements

Laboratory analysis of water samples

SDG Indicator 6.3.2: Results from 2017 and 2020 data drives using Level 1 data

Data submissions from 2017 and 2020 from 96 countries

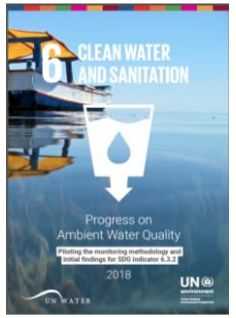


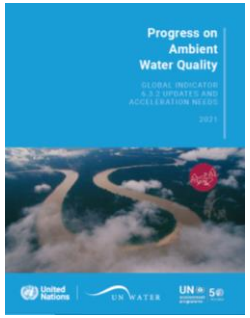
3 billion people could be at risk because the health status of their freshwater ecosystems is unknown

Source: **Adapted from UN-Water (2021)**

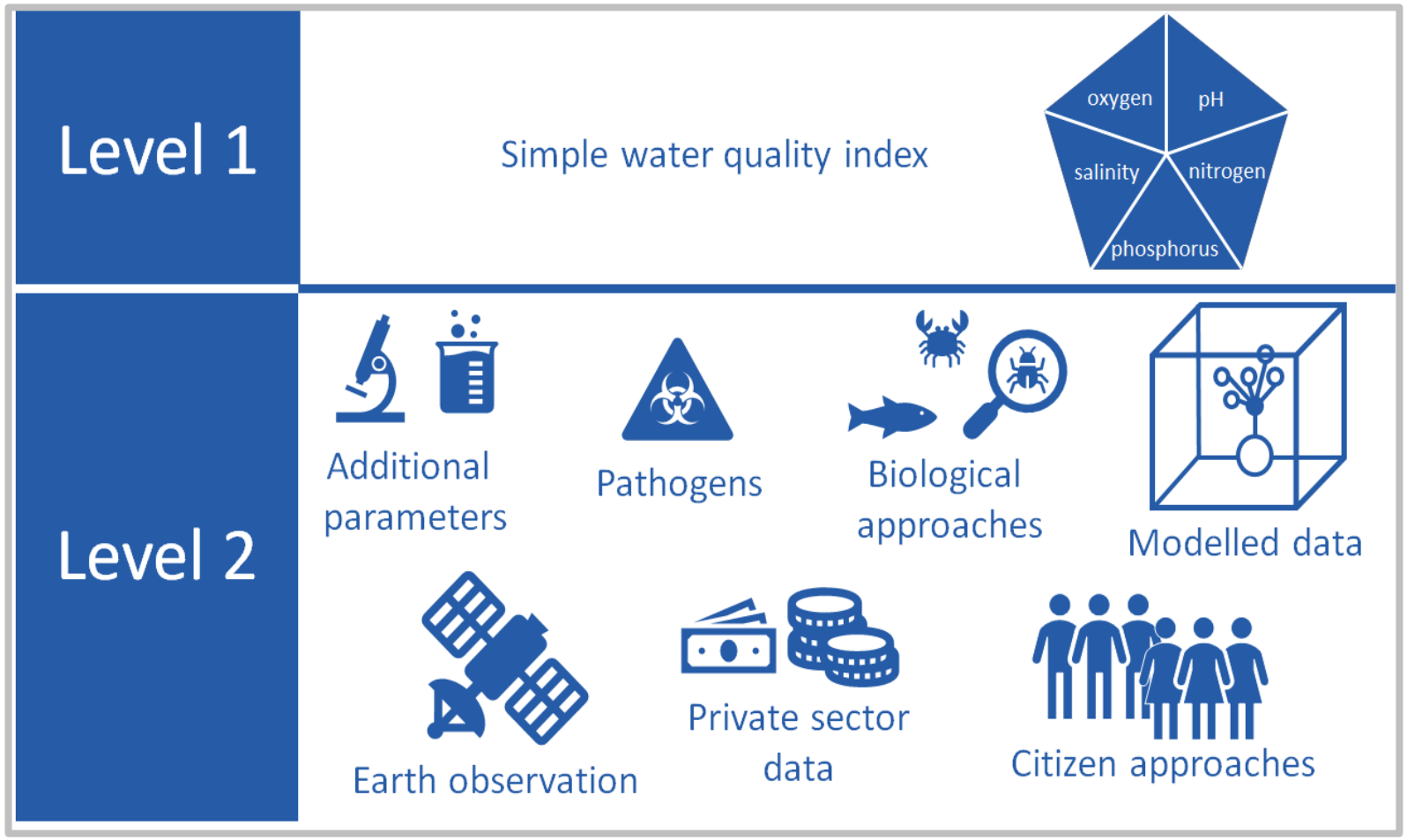
Issues:

- Huge variations in the temporal and spatial coverage used to calculate the indicator in different countries
- Lack of resources to support the additional burden of SDG monitoring in low income countries
- Major additional burden of indicator calculation for high income countries that have thousands of monitoring stations





SDG Indicator 6.3.2: Level 1 and Level 2



LEVEL 1

In situ measurements

Laboratory analysis of water samples

SDG Indicator 6.3.2: Challenges with Level 2 data

Accuracy – how do results compare with traditional *in situ* measurements?

Comparability – are methods sufficiently standardised to support global comparison?

Distrust of non-standard approaches at senior agency and government levels

Integrating alternative data (remote sensing, *in situ* sensors, citizen science, models) into a global index

Evidence – currently few examples are available that can demonstrate use of Level 2 data for SDG indicator 6.3.2

Benefit of involving citizens scientists in monitoring SDG indicator 6.3.2

Increased spatial and temporal monitoring capacity at relatively low cost

Community driven activities to manage and improve water quality

Community driven pressure on policy makers to monitor and manage freshwater resources, e.g. Kenya

Increased education and awareness of the need for protection and management of freshwater resources

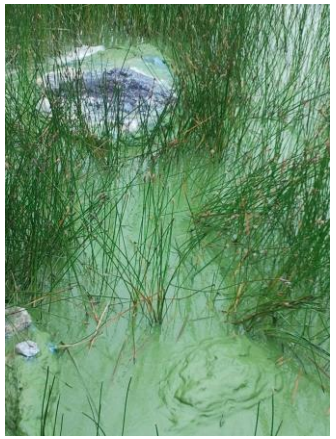
Citizen Science: Different approaches – different benefits and challenges

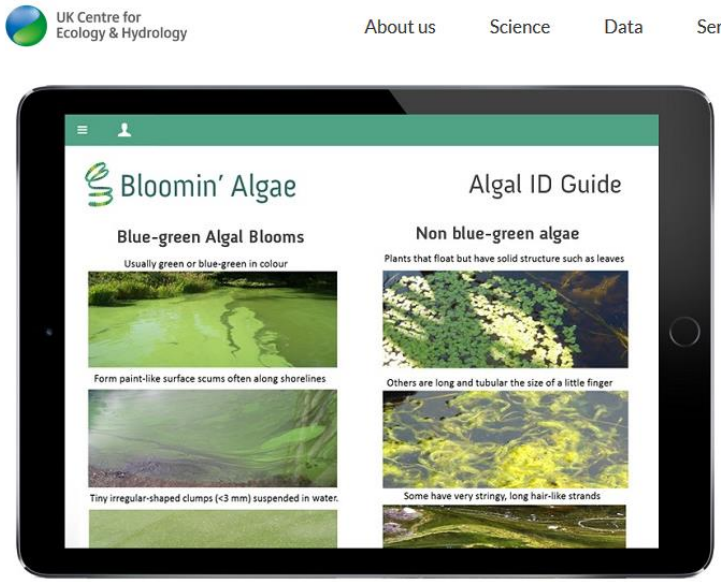
Physico-chemical methods

Ecosystem health monitoring

Observational methods

http://www.minisass.org/en/

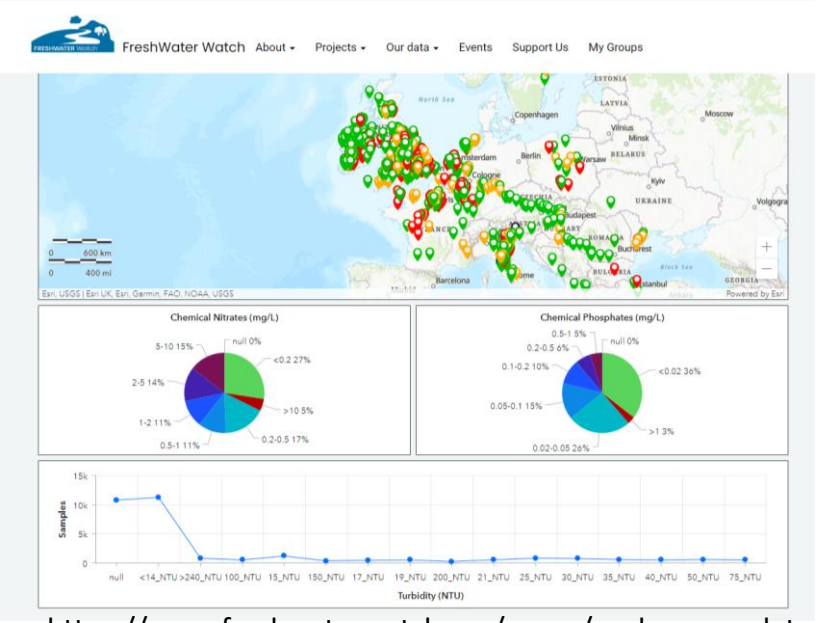




https://www.ceh.ac.uk/news-and-media/news/bloomin-algae-new-app-help-reduce-public-health-risks-harmful-algal-blooms

Challenges for Citizen Science monitoring at global scale

- Regular community engagement and support needed from experts/trainers/agency staff to ensure long-term sustainability of monitoring activities
- Variations in methods and their mode of reporting, i.e., lack of standardised approach at global scale could lead to comparability issues
- Collecting and aggregating the data from individual citizen scientists – not all have access to on-line data submission
- Sharing the data amongst the community - quick and easy feedback necessary with interpretation of the findings to maintain engagement
- Sharing the data with other users in the global community – how?



https://www.freshwaterwatch.org/pages/explore-our-data

https://akvo.org/

Citizen Science and water quality data for SDG indicator 6.3.2

More examples are needed

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Validating citizen science monitoring of ambient water quality for the United Nations sustainable development goals

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HIGHLIGHTS

- Citizen science is a potential source of support for Sustainable Development Goal 6
- UN Sustainable Development Goal (SDG) 6—Clean Water and Sanitation for all
- SDG Indicator 6.3.2 aims to monitor ambient water quality
- Citizen scientists can monitor for SDG Indicator 6.3.2 using simple field kits
- Citizen science could support water quality monitoring in developing countries

GRAPHICAL ABSTRACT

ARTICLE INFO

ABSTRACT

sustainability

MDPI

Article

Citizen Science Monitoring for Sustainable Development Goal Indicator 6.3.2 in England and Zambia

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check for updates

Abstract: Citizen science has the potential to support the delivery of the United Nations Sustainable Development Goals (SDGs) through its integration into national monitoring schemes. In this study, we explored the opportunities and biases of citizen science (CS) data when used either as a primary or secondary source for SDG 6.3.2 reporting. We used data from waterbodies with both CS and regulatory monitoring in England and Zambia to explore their biases and complementarity. A comparative analysis of regulatory and CS data provided key information on appropriate sampling frequency, site selection, and measurement parameters necessary for robust SDG reporting. The results showed elevated agreement for pass/fail ratios and indicator scores for English waterbodies (80%) and demonstrated that CS data improved for granularity and spatial coverage for SDG indicator scoring, even when extensive statutory monitoring programs were present. In Zambia, management authorities are actively using citizen science projects to increase spatial and temporal coverage for SDG reporting. Our results indicate that design considerations for SDG focused citizen science can address local needs and provide a more representative indicator of the state of a nation's freshwater ecosystems for international reporting requirements.

Environ Monit Assess (2020) 192:218
https://doi.org/10.1007/s10661-020-8193-6

Applying citizen science to monitor for the Sustainable Development Goal Indicator 6.3.2: a review

Lauren Quinlivan · Deborah V. Chapman · Timothy Sullivan

Received: 29 October 2019 / Accepted: 28 February 2020

Abstract The United Nations has called for increased public participation in scientific research, to benefit professionals, the public and the planet. Citizen science has been suggested as a cost-effective means by which this call can be met, and by which monitoring for the Sustainable Development Goals (SDGs) may be carried out. Indeed, citizen science has gained significant attention in recent years as the scale of environmental issues surpasses the monitoring resources that currently exist. However, many challenges continue to act as a barrier to the acceptance of citizen science as a reliable scientific approach. Here, the current state of knowledge on the use of citizen science in water quality monitoring is reviewed, and the potential for utilizing this approach quality" is evaluated. The objective of this review is to identify key knowledge gaps and hurdles hindering the adoption of citizen science contributions to water quality monitoring under the SDGs, so that these gaps may be addressed in a timely manner for future monitoring programmes.

Keywords Citizen science · Water quality monitoring · Sustainable development goals · Ambient water quality · SDG 6

Introduction

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Water Policy

WORLD WATER COUNCIL

IWA PUBLISHING

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Social change innovations, citizen science, miniSASS and the SDGs

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ABSTRACT

The United Nations Sustainable Development Goals (SDGs) describe a course of action to address poverty, protect the planet and ensure prosperity for all (https://sdgs.un.org/goals). More specifically, SDG 6 clarifies how water quality, quantity and access are crucial to human well-being, and yet human activities are compromising water resources through over-exploitation, pollution, as well as contributing to the spread of disease. Globally aquatic ecosystems are highly threatened and concerted efforts by governments and civil society to 'turn the situation around' are simply not working. Human-created problems require human-centred solutions and these require different ways of thinking and acting to those behaviour patterns that are contributing to the challenges. In this paper, we first consider *causal* approaches to attitude change and behaviour modification that are simply not working as intended. We then explore *enabling* responses such as citizen science and co-engaged action learning as more tenable alternatives. SDG 6 has a focus on clean water and sanitation for all. The SDGs further clarify how the extent to which this goal can be realized depends, to a large extent, on stakeholder engagements and education. Through stakeholder engagements and educational processes, people can contribute towards SDG 6 and the specific indicator and target in SDG 6.b – Stakeholder participation. Following a three-year research process, that investigated a wide range of participatory tools, this paper explores how the Stream Assessment Scoring System (miniSASS; www.minisass.org) can enable members of the public to engage in water quality monitoring at a local level. The paper continues to demonstrate how miniSASS can contribute to the monitoring of progress towards Sustainable Development Goal 6.3.2., as a Level Two indicator. miniSASS is proving popular in southern Africa as a methodology for engaging stakeholder participation in water quality monitoring and management. The technique

Citizen Science: New initiatives for water quality monitoring at global scale

Workstream within the WWQA - led by UNEP GEMS/Water and FreshwaterWatch

- Call for global collaboration to promote the generation and use of citizen science data for SDG indicator 6.3.2
- Produce a policy brief to encourage governments to consider use of citizen science data
- Highlight best practice
- Case studies and successful examples, e.g., Zambia and Sierra Leone
- Guidance and support
- Foster and promote citizen science

Thank you for your attention
Any questions?

For further information:
Contact me: d.chapman@ucc.ie
See https://www.ucc.ie/en/gemscdc/
https://communities.unep.org/display/sdg632/Documents+and+Materials

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