Citizen science in education: An opportunity for improved water quality in South African rivers?

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South Africa's freshwater resources face severe challenges, with the 2023 National State of Water Report (DWS, 2024) indicating that from a microbiological perspective, 100% of tested sites were unsuitable for drinking without treatment. Deteriorating freshwater quality is largely attributed to poorly treated wastewater pollution, which has been linked to factors such as population growth exceeding design capacity, lack of necessary budget, ageing infrastructure and lack of capacity. Whilst many of these factors can be seen as systemic and thus difficult to alter, education and development of capacity may offer a possible solution to improved sustainability of these plants. One of the main drivers of unsustainable practices is non-intentional actions as a result of misinformation and ignorance. Environmental education and capacity development are often focused on mitigating this by improving knowledge, skills and understanding of environmental systems. However, in order to make meaningful changes, it is necessary to move environmental knowledge, skills and understanding to action. One method that has been suggested to do this, is the incorporation of Social-Ecological Systems (SES) and Citizen Science (CS) in education. By understanding the complexities of SES which can emerge through CS programmes, there is evidence that participants can develop both the science knowledge and skills but also the agency to effect changes (often referred to as Environmental Science Agency). This paper seeks to examine the role of CS in understanding the interconnectedness of SES systems and the relationship to learning and student actions and agency, especially in those working in the water sector, often as process controllers in wastewater treatment works. In order to understand how involvement in this CS initiative has influenced students' understanding of SES as well as their own knowledge, skills and actions within their workplace and at home, a qualitative questionnaire will be sent to current and past students who have been involved in CS. Going forward, the researchers would like to turn the IIE MSA property into a "Living Lab project". By understanding how students have experienced the CS mitigated learning process, we hope to ensure that the Living Lab project is designed in such a way to ensure it provides opportunities for scientific and SES research, teaching and learning and community/ citizen participation and engagement, ultimately building capacity in the water sector and resulting in improved water quality in South Africa's rivers.