

The threefold potential of environmental citizen science

What is the role of knowledge generation, learning and civic participation in citizen science?

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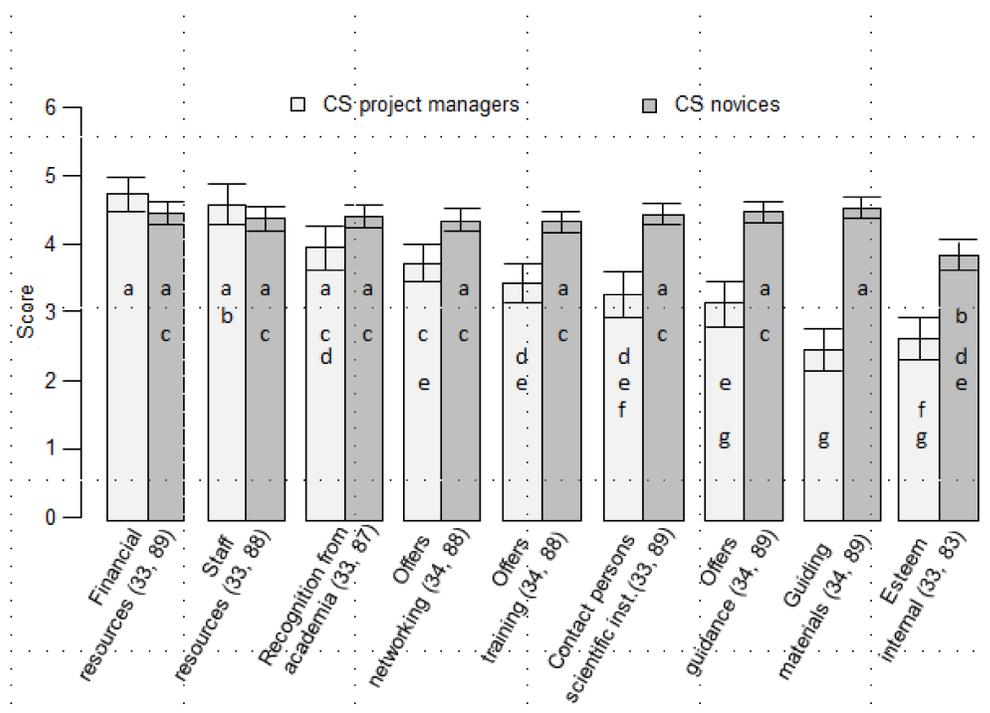
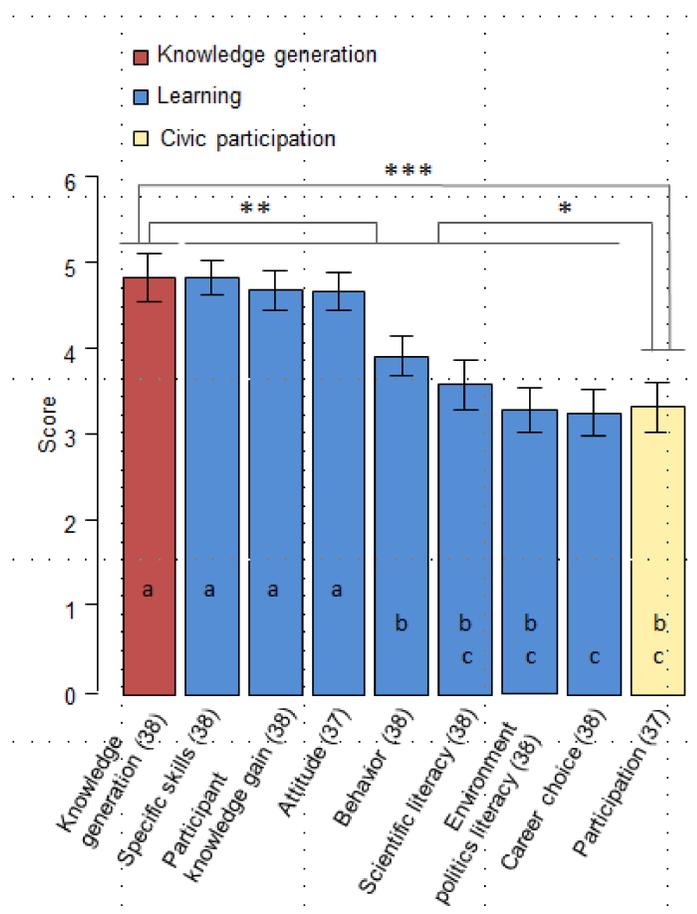


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Citizen science offers significant innovation potential in science, society and policy. Citizen Science provides opportunities to **generate knowledge** and **insights** which are new for and relevant to science, society or administration and management, especially with respect to nature conservation. Also, citizen science can contribute to **learning about science** and the environment as individuals can acquire knowledge which is new to them and **gain skills** as well as **scientific and environmental literacy** through involvement in citizen science projects. Citizen science can further allow for **empowering citizens** by providing scope for civic participation and involving people in policy-relevant debates and decision-making processes. Here, we investigate how these aims are realised in environmental citizen science projects and assess needs and challenges for advancing citizen science and stimulating future initiatives.



Finding: Capacities for peer-reviewed publishing of citizen science findings need enhancement. Structures for networking and guidance are highly relevant for citizen science, especially for novices.

Finding: Citizen science can foster the three goals of knowledge generation, learning and civic participation. Civic participation is less anticipated as a goal than learning and knowledge generation.



Finding: Systematic evaluation is needed to assess citizen science learning outcomes.

Methods: We conducted a **quantitative, web-based survey** with **143 experts** from the environmental and educational sector in Germany, Austria and Switzerland.

Analysis: To examine our data we ran a **linear mixed effects model** in R version 3.0.1 (R Core Team 2013) and applied **ANOVA and maximum likelihood testing** as well as post-hoc analysis.

Conclusion: Citizen science project managers pursue goals related to civic participation generating new knowledge and creating learning opportunities. Systematic evaluation is needed to gain a better understanding of citizen science learning outcomes, for which criteria need to be developed. Fostering project formats that allow **participants to get involved in the whole research process** – from posing the study question to implementing results – could enhance the **transformative aspect of citizen science** at a societal level. Important **structural aspects** that need to be addressed include adjustments in **funding schemes**, facilitation of **communication** between citizens and academia-based scientists, and offers for **training, guidance and networking**.

