

Project *brief*

Thünen Institute of Biodiversity

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Quality assurance indicators for citizen science-based monitoring of biological diversity in agricultural landscapes

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- **Citizen Science-based monitoring of biological diversity complements monitoring schemes to gain an understanding of the status quo of biodiversity, trends and underlying cause-effect relationships.**
- **Indicators are developed to assess the effectiveness and efficiency of volunteer-based biodiversity monitoring schemes in MonViA modules.**
- **The presented sets of indicators address the needs and barriers of participants to taking part in environmental monitoring schemes.**
- **Indicators are developed as project quality assurance to serve internal and external communication and project management.**
- **Indicators can inform decision-makers in policy as well as funding agencies.**

Background and aims

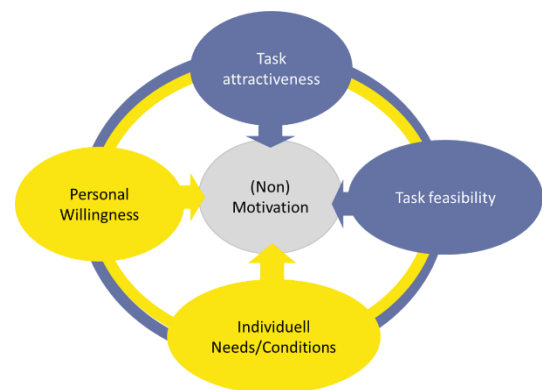
The majority of biodiversity monitoring schemes are established by non-governmental and volunteer-based initiatives and hosted and supported by national and regional NGOs and informed society. Some schemes are supported by academia. Over 80% of biodiversity data on biological diversity are gathered by a very heterogeneous group of dedicated volunteers (Chandler et al. 2017; Schmeller et al. 2009). All contemporary and future monitoring schemes of biodiversity will depend on the engagement of volunteers with restricted access to areas and regions, time, and resources required for monitoring. This also accounts for biodiversity monitoring in agricultural landscapes.

In Germany, agricultural landscapes cover around 50 percent of the land for agricultural purposes. Therefore, agriculture plays an important role in the conservation and promotion of farmland biodiversity. In the MonViA scoping study, volunteered-based biodiversity monitoring modules are developed and tested to support data-driven trend monitoring schemes.

The key to the success of any monitoring scheme is when the needs of the participants are being met and the motivation of the participants persists to engage and retain in the scheme. Here, I developed indicators to qualitatively and quantitatively record and assess progress in citizen science-based monitoring programs and anticipated outcomes from a participant's perspective. The indicators are considered tools to assess how

effective the schemes are designed, coordinated, communicated, and performed from the view of a participant.

The starting point of the study was the identification of social factors and task-related factors impacting personal willingness and (non) motivation for group task such as biodiversity monitoring (Figure 1).

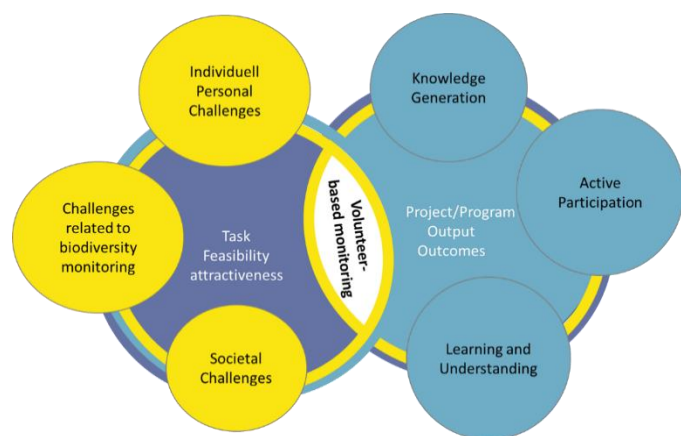


Sets of reasons hindering or enabling citizen and stakeholder engagement in agricultural research were identified at the Thünen- Citizen Science Conference in 2020 (Richter et al. 2020), complemented by a scoping literature review and the development of actions to overcome the hindering factors for volunteer commitment in environmental monitoring.

Key findings

The roundtable discussions at the conference revealed that the main barriers to volunteer and stakeholder engagement in agricultural research are “lack of knowledge”, “lack of digital know-how”, “insufficient digital infrastructure to use applications for recording biological diversity”, “lacking spare time” as well as “missing access, e.g., to initiatives originated by academia”. Further, the factor “receiving appreciation for the engagement and participation” is still not adequately honored in society and is considered a barrier to participation.

The scoping literature review revealed several additional factors building barriers to participation in biodiversity monitoring. The grouping of the factors shows that personal challenges (e.g., no time capacities, demographic factors, or insecurities in dealing with other people), challenges associated with biological monitoring (e.g., unfamiliarity with the concept of biodiversity or erosion of taxonomists and biodiversity experts), and societal challenges (e.g., lack of recognition and feedback within the community or discrimination and degradation of social status) hinder individual participation (Figure 2, yellow circles).



Further, it became evident that also factors related to the achievement of goals and outputs in environmental citizen science affect people’s engagement in these schemes. For example, not all training modules offered for volunteers in environmental monitoring schemes address different learning types and learning motivations, leading to a barrier to achieving the citizen science goals of learning and understanding. Concern exists that no “real” participation (pseudo-participation) is suggested, leading to the failure of achieving active participation through citizen science (Figure 2, turquoise-colored).

From this collection of factors, actions were formulated to overcome these challenges such as i) capacity building for volunteer-based engagement, (ii) appreciation and valuing of volunteer commitment, and (iii) education and learning in

volunteer-based approaches. Based on these actions, sets of indicators were derived. A subset of indicators is presented here (Table).

Capacity Building	Appreciation	Education and Learning
Ratio of active and inactive volunteers	Number of meetings, workshops, and opportunities for encounters and exchanges	Number of educational units (e.g. on concept biodiversity, knowledge transfer, identification)
Quality of communication and organisational measures	Quality of established partnerships and collaborations	Quality of educational units
Consultations and advice integrated in the scheme	Quality of instruments of recognition	Level of evaluation of education and learning units regarding impact

Advice for policy-makers

To support citizen science-based monitoring of biological diversity in agricultural landscapes, policy-makers could address several aspects at the same time. Established monitoring schemes with citizen science modules are encouraged to apply the developed indicators and assess the effectiveness of the schemes from the perspective of the participants. Further, future schemes apply mixed-evaluation approaches, including conventional evaluation from outsiders as well as participatory evaluation by insiders, to expand the sets of indicators presented. Also, policymakers can assure the persistence of the developed citizen science-based monitoring schemes by the installment of permanent organizational infrastructure and the support of citizen science projects to improve the practice of citizen science in agricultural landscapes.

Literature:

- Chandler, M., et al. (2017). Contribution of citizen science towards international biodiversity monitoring. *Bio-logical conservation*, 213, 280-294.
- Schmeller, D. S., et al. (2009). Advantages of volunteer-based biodiversity monitoring in Europe. *Conservation bi-ology*, 23(2), 307-316.
- Richter, A., et al. (2020). Citizen Science-Neues Beteiligungsformat für die Forschung zur Agrar-, Forst-, Fi-schereiwirtschaft und zu ländlichen Räumen? (No. 146). Thünen Working Paper.

Further Information

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Support