

Policy Brief

Empowering Local and Regional Authorities through Citizen Science and Public Engagement: A Framework for Inclusive Governance

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Introduction

In contemporary governance practices, fostering inclusivity and participatory decision-making, is crucial in sustaining effective policy implementation. This, coupled with need to produce information and knowledge that backs up policy formulation, becomes a constant issue for policymakers, especially in a challenging context of data scarcity, and extended gaps between societal and governance stakeholders.

This policy brief presents a framework for using citizen science as a powerful tool to empower local and regional authorities, thereby enhancing governance processes. Governments can better address complex challenges, foster transparency, and tap into the collective intelligence of their communities by combining citizen science with a real collaborative (bottom-up) process. This document outlines the significance of integrating citizen science into decision-making processes, fostering public participation and contributing to informed decision-making. Moreover, it identifies some policy gaps and offers a few policy recommendations, based on the experience of the [WBC-RRI.NET](https://www.wbc-rri.net) project.

What is Citizen Science?

While the concept of citizen science was piloted as early as 1600s, the term originates from the 1990s, from the work of sociologist Alan Irwin and ornithologist Rick Bonney, respectively. It represents both (1) the concept of engaging the public in scientific processes to address their concerns and (2) the involvement of non-scientists in collecting data for scientific research. The term was officially recognized in 2014 by the Oxford English Dictionary, defining it as “scientific work carried out by the general public in collaboration with or under the guidance of professional scientists and institutions.”

Nowadays it is widely acknowledged that citizen science is a pivotal instrument in research management, broadly used in different scientific disciplines, from astronomy, biology and ecosystems; meteorology; to cyber science, etc. Even though traditionally not related to humanitarian disciplines, citizen science is also pivotal in civic science and participatory sensing.

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Citizen Science for Local and Regional Authorities

Local and Regional Authorities may benefit from citizen science because it provides them with access to extensive data collected by citizens, enabling comprehensive monitoring of environmental conditions, public health trends, infrastructure needs, and many more. This type of community engagement also fosters empowerment, leading to more informed decision-making and policy development. The array of ways into which citizen science can be incorporated into decision-making processes include:

- **Level 1: Contributory Citizen Science**

At this stage, individuals actively gather data while adhering to established guidelines that scientists or organisations give. Local and regional authorities can benefit from the assistance of citizen scientists in gathering important data for a variety of applications, such as public health monitoring, infrastructure assessment, biodiversity mapping (which replicates Bio-Blitz models), infrastructure monitoring, and environmental monitoring.

- **Level 2: Collaborative Citizen Science:**

Collaborative citizen science involves active collaboration between citizens and scientists throughout the research process, from defining research questions to data analysis and interpretation. This level of engagement fosters co-creation of knowledge and empowers citizens to participate in decision-making processes directly.

- **Level 3: Co-created Citizen Science**

Co-created citizen science emphasizes partnership and co-design between citizens, scientists, and policymakers. Participants work together to identify research questions, design methodologies, and implement solutions collaboratively.

- **Level 4: Community-led Citizen Science**

In community-led citizen science, communities take the lead in defining research priorities, conducting studies, and implementing solutions to address local challenges. While scientists and policymakers may provide support and guidance, the initiative is driven by community members themselves, thus the knowledge produced is more contextual and effective.

Public engagement, as first discussed by Arnstein (1969), is seen as a continuum of 8 steps, from 1) Manipulation and 2) Therapy (as non-participative ways), to 3) informing and 4) Consultation; towards 5) Placation; 6) Partnership, 7) Delegation and 8) Citizen Control.

Citizen science practices need to be addressed as a continuum as well, with efforts mobilized to move up from mere contributory citizen science, to community-led, empowered initiatives.

Benefits of Citizen Science and Public Engagement in inclusive governance

Citizen science engages a diverse array of participants in data collection, leading to larger datasets that capture a broader range of perspectives and experiences. This influx of data **improves the accuracy and relevance of information available** to policymakers, enabling

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them to make more informed decisions grounded in real-world observations and community needs.

By involving citizens in the policymaking process, **governments demonstrate a commitment to transparency, accountability, and inclusivity**. Public engagement fosters trust between policymakers and communities, creating a collaborative environment where stakeholders feel valued, heard, and empowered to contribute to decision-making processes.

Citizen science and public engagement **facilitate the co-creation of solutions** to sustainability challenges by tapping into local insights and innovations. This leads to more contextually sound policy interventions, ensuring their implementation in the long term.

On the other hand, per definition, citizen science **stimulates innovation** by democratizing access to scientific knowledge and resources. Coupled with several digital tools to facilitate big data collection and processing, and involving a myriad of socially innovative skills, the method enhances both, the policy discussion, as well as the scientific milieu in general.

Lastly, these initiatives **build and capacitate social capital** by fostering connections and collaborations among diverse stakeholders. By bringing communities together around shared goals and interests, these initiatives promote solidarity, awareness, and more positive attitude of communities towards their societal role.

Challenges related to citizen science and public engagement

To ensure the integrity and effectiveness of citizen science initiatives, the following challenges need to be addressed:

- **Data Quality**

To ensure that citizen-generated data is accurate, consistent, and reliable, strong validation procedures are necessary. In order to overcome potential biases and inaccuracies, training programmes are essential in educating participants on data gathering techniques, methodologies, and quality standards. Harmonising data from many sources also improves comparability, which raises the dataset's overall quality.

- **Digital Exclusion / Disparity**

Efforts should be made to bridge the digital divide in light of differences in access to digital resources. This means that all citizens should have access to user-friendly interfaces and training in digital literacy. Furthermore, through cooperation with NGOs, alternative participation channels—like offline techniques and community workshops—offer inclusive options for engagement, especially in places with inadequate internet infrastructure.

- **Ethical Considerations**

Maintaining moral principles is crucial for citizen science projects. Important steps include obtaining informed consent, upholding participants' rights, and safeguarding privacy. To ensure the protection of personal data obtained during projects, it is necessary to implement methods to anonymize and safeguard participants' responsibilities, risks, and rights in a clear and concise manner.

- **Fairness**

Encouraging inclusivity and diversity is essential for fair participation in citizen science. Promoting participation from a range of demographics and working with local authorities and groups can help guarantee that different groups are represented. In order to accommodate linguistic variety, language accessibility further improves inclusion by offering resources in multiple languages.

- **Long-Term Sustainability**

Investments in funding methods that sustain ongoing programmes and capacity training are necessary. The lifespan is ensured by developing sustainable funding methods and training local capacity.

- **Scientific Validity**

Preserving scientific integrity is crucial to preserving the validity and dependability of data supplied by citizens. The integrity of citizen science programmes is further reinforced by enhancing data quality and validity through peer review processes and encouraging collaboration between citizen scientists and domain specialists.

Best practices based on WBC.RRI.NET activities

The [WBC-RRI.NET](#) project has supported the development and promotion of citizen science activities, as a means to link governance actors and the research and innovation stakeholders with the societal layer. Best practices based on the project's activities include:

- Engage with regional stakeholders to produce activities related to citizen science within the [Working Group 2 on Science Education and Public Engagement](#).
- Disseminate within the Western Balkans networks knowledge on the power of citizen science, including '[A month dedicated to CS](#)'.
- Incorporation of citizen science tools for Social and Humanitarian Sciences as part of the Anchor Initiative '[Science Education and awareness raising for educators with a focus on STEAM](#)'.
- Incorporation of public engagement and citizen science within the Anchor Initiative 'Development of a threefold public engagement plan towards climate and environmental issues in the Country of Montenegro'
- Supporting the first public call on Citizen Science initiatives in Serbia, through the University of Novi Sad.
- Developing a few policy recommendations (briefs) on the importance of citizen science [for STEM](#); and in relation to [student's perception](#).
- Incorporating citizen science as main topic in open dialogue and mutual learning events, organized in Novi Sad; Ohrid; Skopje, etc., while synergizing with the European Citizen Science Association.
- Publishing a webinar on '[Spreading Citizen Science in WB](#)'.
- Organizing a dedicated roundtable on citizen science within the framework of the [Open Science Communication](#) conference 2022.

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Most notably, piloting citizen science to improve evidence-based policy decision-making was at the core of the anchor initiative developed in Albania, by Co-PLAN and Ministry of Tourism and Environment in the Kune Vaini lagoon. The citizen science initiative's primary focus was to enhance understanding of the tangible value of the ecosystem for both regional authorities and residents by conducting a comprehensive economic value assessment of ecosystem services. The citizens were engaged in a myriad of forms, including: co-design of methodologies for assessing ecosystem services; participatory mapping of historical flooding; participatory mapping of touristic potentials in the area; co-assessment of solutions and policy recommendations for biodiversity protection; etc.

Despite encountering challenges such as data gaps and limited capacity within the regional administration that manages the target protected area, the initiative persisted through collaborative efforts involving local stakeholders, including 110 households and more than 20 business operators.

Notably, the community pillar emerged as a central aspect of the project, despite initial hesitancy among certain stakeholders. Through an interactive and inclusive approach, trust was incrementally created, and participants became actively engaged in following discussions and project activities. The process helped, on the citizen's side, to set up a more collaborative attitude towards the governing bodies (regional and national), which was stagnant beforehand. On the governance side, the process allowed for establishment of a reliable knowledge platform, building valid evidences (on biodiversity, flooding; pollution; anthropocentric behaviour; etc). The knowledge that was produced, therefore, served both citizens, fostering slight (and difficult to measure) behavioural change; and governance actors, who have established a robust baseline for the development of the Protected Area Management Plan.

Based on these experiences, the consortium of the WBC-RRI.net project has drafted a series of recommendations to replicate similar positive outcomes.

Recommendations:

It is advised that the process of embedding citizen science as methodology/tool for policy support is preceded by three main actions.

First, a proper **capacity development roadmap** needs to be established, which includes provision of training and resources with regional and local authorities, to anchor them properly as beneficiaries of the results of the science activities. These trainings need to include capacity building on science communication for government representatives, highlighting the importance of co-design processes in addressing strategic decision-making (such as climate risk strategies); and ensuring that this type of coaching is extended throughout the whole period of the citizen science activity, with governance stakeholders playing a leading role in the process. Findings from the pilot cases in WBC-RRI.net suggested that only in this way, the government actors could fully embrace the importance of the process, and use the scientific knowledge produced in effective way.

Secondly, while sporadic actions are commendable, because they respond to specific local needs, the **integration of citizen science as practice at policy level** is very important to

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fully make use of the potentials. This would entail the integration of each country's research agendas with the policy arenas and developing Guidelines for Citizen Science for each target policy. This becomes very important for Western Balkan countries, which are undergoing the digital and green transitions, and need to institutionalize strategies and targets to adhere to both these requirements.

Thirdly, and following the policy integration, it is recommended that **citizen science is established as a collaborative platform** with Quintuple Helix stakeholders, working in different levels of engagement, and through different sets of expertise. Such platforms may take form on networks, associations, or even agencies (or departments within agencies), which are responsible for securing cross-sectorial collaboration within citizens, scientists and researchers, and policymakers.

Fourthly, in order to sustain these initiatives, **specific earmarked funding** needs to be allocated by the respective line ministries (distributed to Higher Education Institutes, Research Performing Organizations or disbursed through Open Calls for citizen science initiatives).

Finally, some recommendations on ensuring a successful citizen science initiative when interacting with citizen scientists and the general public include the following:

- **Building Trust** is foundational to the success of citizen science, emphasizing the importance of fostering transparent and collaborative relationships with citizen scientists or local communities.
- **Production of Knowledge** does not have to be immediate, but rather incremental. Recognizing this, initiatives must adopt an iterative approach that accommodates diverse perspectives and insights, without prejudice.
- **Citizen science activities may require more time than initially anticipated**, necessitating patience and perseverance to navigate complexities effectively. The activities, even though aiming at reaching specific targets and scientific outcomes, may be encouraged to focus on the process per se, as a learning loop.
- To ensure **accessibility and relevance**, scientific language should be adapted to the local context, promoting clearer communication and understanding among participants. Science communication, indeed, becomes a prominent issue in this regard, not only for reaching the general public, but also the governance actors.
- **Collaboration with reliable community representatives or Civil Society Organizations (CSOs) is crucial** for the effectiveness of citizen science methods, leveraging local expertise and resources. These organizations have developed skills in communicating and empathizing with societal challenges and representatives, while being agile in collaborating
- **Inclusive participation** from all sectors of the quadruple helix, including local businesses, municipal staff, academics, and community representatives, enhances the success and impact of citizen science activities.

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Suggested further reading:

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