

Citizen science in the making: mapping participatory science projects in Hungary

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Citizen science in Hungary is a long unexplored field of research and an underused methodology of scientific engagement. However, online media are increasingly reporting on the involvement of citizen scientists in scientific work, and publishing calls for volunteers to participate in scientific crowdsourcing projects.

While participatory research projects have a long history among social scientists, citizen science is slowly but gradually gaining recognition among researchers and NGOs. During the two years of the present research process (2020-22), a number of citizen science initiatives have been launched, particularly in the fields of biology, ecology, agricultural science, urban science and other disciplines.

Researchers from the Environmental Social Science Research Group (ESSRG) conducted 32 semi-structured interviews with project coordinators, community managers, research practitioners, research funders and policy-makers to better understand the uptake of citizen science in Hungarian research institutions and civil society. This exploratory study followed a deductive qualitative analysis method based on thematic coding and categorisation of interviews conducted within the QCAMap programme.

Based on the research findings, this paper presents the following five dimensions unveiled in the interviewing process: (1) co-creation and motivations; (2) research findings; (3) impact; (4) challenges; (5) policy-level visions and plans and (6) conclusion. The summary also provides a brief critical overview of policy-level initiatives focusing on citizen science and their current and future potential.

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1. Background

The disparities in scientific knowledge production between Eastern and Western European regions are widely known. In the post-socialist countries, positivist research and predominantly quantitative methods dominate and there is less experience of interdisciplinary processes. Citizen science as a method of scientific engagement has long been invisible and under-researched in this region [1]. Similarly, citizen science projects in Hungary are relatively under-researched. Initial surveys have found that the terminology and methodological possibilities of citizen science have attracted the attention of researchers in the natural sciences [2]. Between 2020 and 2022, local online media also increasingly reported on the potential of citizen science to voluntarily engage citizens in scientific research processes.

1.1. Participatory research methods

Although citizen science is a rather emerging methodology in the Hungarian academic and NGO scene, Participatory Action Research (PAR) is more established as a transformative learning and action-oriented research process. It first became known among social scientists studying segregation, racism, Roma populations and disability discrimination [3]. Only in the last few years has citizen science slowly but surely gained recognition, primarily in the natural sciences. In the social sciences, only archaeological and social work projects have applied and promoted citizen science to collect large datasets and achieve public involvement in research processes [4].

1.2. Usage of terminology

When contacting the stakeholders involved in citizen science, I encountered a fundamental contradiction: not all project owners know and endorse the term citizen science. Of those approached, three project owners refused to be interviewed, saying that their research was not considered to be citizen science, or ultimately rejecting the whole field of citizen science. Further controversy arose over the proper translation of "civil science" to Hungarian. Some project owners prefer the term "civil science" (civil tudomány), while others, together with Hungarian policy makers, explicitly favour the term "community science" (közösségi tudomány).

Although both translations may refer to grassroots scientific engagement, the Hungarian term "civilian" (*civil*) has been politicised and used negatively since 2010, under the current authoritarian political regime of Viktor Orbán. Civil society in Hungary has a history of counter-movement [5] which, even at the level of terminology, is threatening to the current system¹. Therefore, Hungarian citizen science is rather a cover for top-down data collection projects led by professional researchers. These projects are often called "community science", although they have little to do with community-led research and empowerment.

2. Research question and methodology

The overall purpose of the mapping research was to get a general overview of ongoing and emerging citizen science projects in Hungarian academia and civil society, and thus to better understand the achievements and challenges of the science-society interface. I investigated how citizen science has evolved, how it developed with the involvement of volunteers and how it can be sustained. Incentives and planning at the policy level were frequently mentioned during the interviews. To better understand this, I looked at current policy documents to complement the policy-level interviews.

From November 2020 to February 2021, I conducted a media content analysis to identify currently active and publicly visible citizen science projects in Hungary.

¹ While conducting the interview, a few interviewees corrected me when I used "civilian" in my translation. They explicitly asked me to correct the terminology in my interview design and use "community science" consistently. The expression "civilian" was not accepted as it might refer to civil society.

Between January and November 2021, I conducted 32 semi-structured interviews with project stakeholders, including project coordinators, community managers, research presenters, and research funders and policy makers. Out of 32 interviews, 28 interviews were explicitly focusing on local citizen science projects (see the table 1 below) and 4 interviews conducted with policy makers and museum experts. The exploratory study relied on qualitative analysis of interviews and thematic coding and categorisation of interviews conducted in the QCAMap programme. Deductive content analysis was applied to collect data on the following five identified dimensions, which were covered by the interview questions: (1) co-creation and motivations; (2) research findings; (3) impact; (4) challenges; (5) visions and plans.

Table 1: Reviewed citizen science projects in Hungary

Name	Project	Research field
Járókelő (Passer-by)	Maintaining public places	Urbanism
Járókelőkutató (Passer-by Researcher)	Researching agri-food practices	Agri-food, ecology, biology
Vadonleső (Wild harvester)	Monitoring wildlife	Biology, ecology
Dendrománia (Dendromania)	Monitoring tall trees	Forestry
Madárszámláló (Bird counter)	Monitoring birds	Ornithology
Herp Térkép (Reptile Map)	Monitoring reptiles	Herpetology
Levegő Munkacsoport (Air working group)	Measuring air quality	Meteorology, education
Lepke-háló (Butterfly-net)	Monitoring butterfly population	Entomology
Bogáncslepke Megfigyelés (Butterflies Observation)	Monitoring Vanessa cardui	Entomology
Szúnyogmonitor (Mosquito monitor)	Monitoring mosquitos	Entomology

Szalkay József Magyar Lepkészeti Egyesület (Hungarian Butterflies Observation Association of Szalkay József)	Monitoring butterfly population	Entomology
Meztelen csiga kutatás (slugs and snails spotting)	Monitoring invasive slugs and snails	Biology
Tiszai PET-Kupa (PET bottles spotting)	Monitoring water pollution	Hydrology, Biology, Communication
The GROW Observatory Hungary	Monitoring soil health	Soil science
Roadkill Hungary	Monitoring wildlife on roads	Biology, urbanism
Ízeltlábúak (Arthropods)	Monitoring insects	Entomology
Drinkable Rivers initiatives Hungary	Measuring water quality on the Danube	Hydrology
CSI-COP Hungary	Citizen Scientists Investigating Cookies and App GDPR compliance	Data science
Alsóban az élet! (Life in undies!)	Monitoring soil health by digging cotton underwears	Soil science
Kullancsfigyelő (Tickwatch)	Spotting and monitoring ticks	Entomology
Kankalin projekt (Cowslips project)	Spotting and monitoring Cowslips	Botany
Magyarország Busatérképe (Fishmap of Hungary)	Monitoring invasive fishes	Fisheries science

Rákos-patak civil tudomány projekt (Creek Rákos citizen science project)	Revitalisation of Creek Rákos	Hydrology, ecology, sociology
Citizen Science Mentoring	Citizen Science incubator program	Education
Közösségi Régészet (Community archaeology)	Community-based archaeology	Archaeology
Észlelésfeltöltő (Observation uploader)	Looking for new phenomenon on the sky	Astronomy
YouCount project, two local case studies in Hungary	Citizen social science projects	Sociology, social work

3. Key findings

86% of the projects I interviewed belong to the natural sciences, mainly to the subdisciplines of biology, ecology, agri-food, urban studies and astronomy. Only 14% of the projects assessed belong to the social sciences, mainly archaeology, sociology and data sciences. The majority of projects fall into the category of crowdsourcing citizen science projects, where participation is limited to data collection, volunteers are more like sensors observing a specific area they know, and their cognitive engagement in these projects is very low [6].

Regarding the social sciences and the projects applying social science methodologies, there are merely 7 projects² that go beyond the level of passive, minimal involvement, where volunteers can meaningfully participate in the research process. Community archaeology, Citizen Science Mentoring, Creek Rákos citizen science project, Life in undies, PET bottles spotting, Air working group and YouCount’s local case studies succeeded in involving certain communities in the research process in ways in which participants could contribute to framing the research questions, creative research outputs, publications or disseminations of research results.

3.1. Co-creation and motivations

For researchers and project stakeholders, the most reassuring argument for launching a citizen science project is cost-effectiveness. Due to the limited resources of national research institutions, citizen science has recently been used as an alternative and innovative methodology in natural science research, allowing institutions to carry out large-scale data collection. Ongoing research on invasive species and wildlife habitats, as researchers noted, would be less effective without the involvement of the public. Most of the interviewees have no doubt that citizen science will make research processes more affordable in the long run, while providing researchers with enough reliable and trustworthy data for future publications.

² This number may have increased as more and more citizen science projects have gained experience with public engagement since I finalised the interviewing process.

Although public engagement counts as an achievement, publications are cited as one of the main outcomes of the scientist-led citizen science project. Competition is fierce in scientific institutions. Thus publishing remains the main purpose of institutional research. Therefore it is not surprising that the most common fear among researchers when starting a citizen science project with an open data policy is who will be the first to use and publish the open data. Involving citizens in the research and writing process has not been a common practice in institutionalised research processes. According to the respondents, there is a minor interest among volunteers in jointly creating research questions and participating in writing technical papers. They rather enjoy the mapping, discovering and learning processes.

3.2. Research findings

While cost-effectiveness and publications are the primary motivation to encourage researchers to deepen their knowledge of citizen science, and thus of engagement platforms and methods, training opportunities are also important. Some interviewees expressed concerns about data quality when volunteers were involved. To avoid this, professional digital platforms, guidelines and tools are being developed to ensure successful scientific engagement. In addition, explicit attention is being paid to volunteer training to secure data quality. Training is often focused on collecting good quality data, but it is also common that projects led by research institutes and university professors are willing to educate the next generation of scientists and to promote the often undervalued research profession through citizen science. Citizen science projects often result in short videos, training materials, brochures and online platforms with know-how information. Informal education and awareness raising unfolds during the course of the project, although the primary aim was to collect trustworthy, quality data from the volunteer community.

In ecological, biological and urban citizen science projects, biodiversity disruption, protection of endangered species or public spaces in Budapest has been made possible through open data collection. Sometimes unintended actions and collaborations emerge. The public availability of geolocation data allows local activists and experts to spot vulnerable locations and endangered populations, as Wild harvester (*Vadonleső*) users do. In the case of the Passerby (*Járókelő*) project, for example, a remarkable collaboration between local governments and citizens to make their neighbourhoods habitable has been developed.

3.3. Impact: what has changed?

While the majority of respondents reported feeling more confident about public engagement strategies after starting a citizen science project, they also expressed suspicion about open data policies as they fall outside the scope of so-called rigorous scientific work. Most researchers and project coordinators confidently reported that citizen science had increased the visibility of their research results. In most cases, they tried to establish their own media presence, social media campaigns, communication channels and data collection platforms without the help of science communication experts. It is not uncommon for them to volunteer for this task as there are no institutional incentives, IT support or communication office to assist them with framing their citizen science projects. At best, the local press is willing to promote their calls and present citizen science projects.

Most of the researchers and project stakeholders have experienced great support from their colleagues and students in managing citizen science projects. Citizen science as an experimental method created opportunity for co-learning and raised the need for a high level of expertise in science communication and public engagement in research institutions. Researchers, more than NGO-related project coordinators, recognised the importance of science communication and engagement skills.

3.4. Main challenges

Although the number of citizen science projects is increasing in Hungary, there is a general lack of confidence in the quality of data generated by citizens. Researchers from

predominantly academic research institutions, who have little experience in working with the public, are suspicious of outsourced data collection. This can be traced back to the binary division of expert and contributor roles. Researchers are reluctant to break down these hierarchical relationships and prefer to collect data online with little interaction with volunteers.

Citizen science is not considered a reliably research methodology. In contrast, it is widely regarded as an optional, fun experiment that scientists can conduct voluntarily. It is seen as a science communication experiment that may succeed in recruiting volunteers and collecting mostly unreliable data sets, or in recruiting young researchers. Therefore, researchers have limited funds to develop digital platforms on which they can effectively plan and manage their projects.

In the NGO sector, citizen science is used as a problem-solving tool that serves the needs of specific communities. Projects such as air, water and soil monitoring use sensor kits that are very attractive to schools and local environmentalists. The level of engagement is higher in these cases, while scientific publications can be considered secondary to indicating the extent of pollution.

4. Policy-level visions and plans

Citizen science was first mentioned at the policy level in the National Agency for Research Development and Innovation's position paper on open science (2021): "*Citizen science, also known as community science, is an area of open science activities where researchers and research communities take the initiative to involve citizens, local communities and the wider society in certain research processes*" [7]. At the level of policy-making, "community science" is the accepted and institutionalised term that actually refers to research projects led by professional researchers. Although adaptation of citizen science in research institutes is encouraged, it also explicitly aims at cementing top-down initiatives available to scientists to engage citizens.

Before the document was published in November 2021, my respondents from the National Agency for Research Development and Innovation shared that community science is a science communication priority that they wish to promote through research and education institutions in Hungary, with generous grants specifically allocated for citizen science projects. Mecenatura grants [8] aim at filling this gap at the national level in the upcoming years, although funds are allocated to citizen science as predominately science communication. The National Agency offer grants for research institutions and individual researchers to promote their research outputs. Grassroots, small community, citizen initiatives and cross-disciplinary collaborations are left to find their own way to create citizen science projects.

5. Conclusion

Citizen science in Hungary can be described as a patchwork of different initiatives and research projects. Although few projects consider themselves citizen science, most projects explore the potential of citizen science in their research. Researchers are open to learning and developing new skills in science communication and public engagement, but are also keen to review the map of Hungarian citizen science. The landscape of citizen science lacks transnational dialogue. Although the National Agency for Research Development and Innovation has recently taken the initiative to institutionalise citizen science, grassroots and individual projects are left out of these discussions. The ESSRG has the potential to create a citizen science hub that will provide online education and tutorials for the growing citizen science community. The ESSRG has initiated the creation of the centre through the EU-Citizen.Science project by disseminating news and calls for proposals within the respondent network, but further work is needed to spread citizen science in Hungary.

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Annex

Semi-structured interview guide for mapping citizen/community science in Hungary

Introduction:

Please introduce yourself in a few lines.

In what area do you do citizen/community science research?

In which institutional framework?

Collaboration:

With whom do you collaborate? How do you work together?

What do you collaborate on?

Who makes decisions? What considerations guide decision-making?

What is the point of involving citizens in research? What is the intention?

What are the benefits of collaboration?

Who benefits from this collaboration? Why?

Knowledge production:

In scientific terms, what is the importance of citizen science research?

How is knowledge generated? How are volunteers involved in knowledge production?

In which fields is knowledge typically generated?

What other knowledge is generated?

What forms and ways can this knowledge be organised?

Will it become a shared body of knowledge? Would it have been created without the citizen engagement?

Outcome:

What counts as an outcome? What are the conditions under which it is valid?

Has the outcome of the project led to unexpected insights?

What does the outcome of the project address?

What new opportunities have been created that had not been considered before?

What was/is needed for the project to achieve its objectives?

Could it have been done differently? If so, how?

How do you see it in the near future?

Impact:

Has the attitude towards citizen science changed at the level of institutional and expert networks?

Has the attitude of volunteers changed?

What happened/is happening to the knowledge acquired?

Is it useful? What makes it useful?

Is the production of scientific knowledge democratised? Do you experience any progress in bringing closer science to society?

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