

The impact of citizen science: 12 stories from across Europe

Stefanie Schuerz | Teresa Schaefer | Barbara Kieslinger



ecs

european
citizen
science



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The impact of citizen science: 12 stories from across Europe



Stefanie Schuerz | Teresa Schaefer | Barbara Kieslinger

In this book, we tell 12 impact stories from citizen science efforts implemented across Europe. They serve as examples of how citizen science can create change with and for our society with the aim of achieving a more inclusive and sustainable future.

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Why this book



Citizen science is creating impact with and for the people, going far beyond what can be captured by numbers and statistics. While impact is often measured in figures, these only tell part of the story. The true effects and changes brought about by citizen engagement in scientific endeavours are diverse, profound, and often intangible, extending into areas that numbers alone cannot fully convey. To truly understand the depth and breadth of these impacts, we must turn to the power of storytelling.

Storytelling conveys the richness of data in a way that resonates on a personal level, providing anecdotal evidence and insights into the experiences of those involved. Through stories, we can explore the nuanced ways in which citizen science contributes to change—how it empowers individuals, fosters community, and sparks innovation. Stories give voice to the people behind the numbers, honouring the richness of their experiences and making the impact of citizen science relatable and tangible.

The 12 impact stories presented in this book exemplify how citizen science is contributing to a more inclusive and sustainable future in Europe. Each story highlights the diverse ways in which citizens engage with science, from local environmental monitoring projects and ad-hoc activities in public libraries to strategic endeavours to establish citizen science at national scale and beyond. These stories showcase the power of collective action, where everyday people come together with scientists to create meaningful change.

By telling these stories, we aim to go beyond the numbers and show the real-world impact of citizen science. We hope these narratives will offer

you a glimpse into the potential of citizen science to transform not just the way we do science, but the way we live and work together as a society. As you journey through them, you will see how citizen science is more than just a method of data collection—it is a movement that fosters inclusion, drives sustainable development, and empowers communities across Europe. These stories are a testament to the incredible potential that lies in the hands of everyday citizens when they are given the tools and opportunities to engage with science.

Welcome to a new perspective on citizen science, where the impact is measured not just in numbers, but in stories that bring those numbers to life.

The European Citizen Science project



Building a stronger, more inclusive citizen science community

The European Citizen Science (ECS) project takes flight, driven by a bold vision: a vibrant, inclusive, and globally connected community tackling societal challenges and driving transformative change across Europe. Funded by the European Union (HORIZON-WIDERA-2021-ERA-01-60) for 48 months (August 2022 – July 2026), this ambitious initiative, led by the European Citizen Science Association (ECSA), brings together 21 organisations from 15 European countries.

Building on success, expanding the scope

The ECS project inherits the legacy of past successful initiatives like EU-Citizen.Science and Cos4Cloud, aiming to significantly expand and strengthen the European citizen science landscape. This project champions open science practices, positioning Europe as a frontrunner in integrating citizen participation throughout the research and innovation process.

Widening the circle: engaging newcomers and opening up to new audiences

ECS prioritises inclusivity and community growth. Through innovative initiatives like the European Citizen Science Academy and a dedicated network of ambassadors, the project aims to attract new participants and empower existing ones.

Furthermore, recognising the importance of diversity, ECS actively seeks to engage groups whose voices are still not listened to. This includes collaborating with Public Libraries 2030 network libraries to reach communities usually not participating in citizen science and offering targeted support to regions lacking established citizen science networks or policy frameworks.

Building bridges and sharing knowledge

The project fosters open collaboration through dedicated spaces where citizen scientists can learn about open and FAIR (Findable, Accessible, Interoperable, and Reusable) data practices and tools. This empowers them to actively participate and connect with existing e-infrastructure like the European Open Science Cloud (EOSC) through co-developed data and metadata services.

International cooperation: a global force in citizen science

ECS leverages the expertise of top researchers via the Marie Curie Alumni Association and fosters collaboration with emerging Horizon Europe Missions, Clusters, and wider European Research Area (ERA) activities. This creates a welcoming environment for newcomers and fosters international cooperation through the Global Citizen Science Partnership.

The road to global leadership

By fostering inclusivity, capacity building, and open science practices, the ECS project paves the way for Europe to solidify its position as a global leader in citizen science. This collaborative effort promises to strengthen the global citizen science community, generating scientific advancements and driving positive societal change.

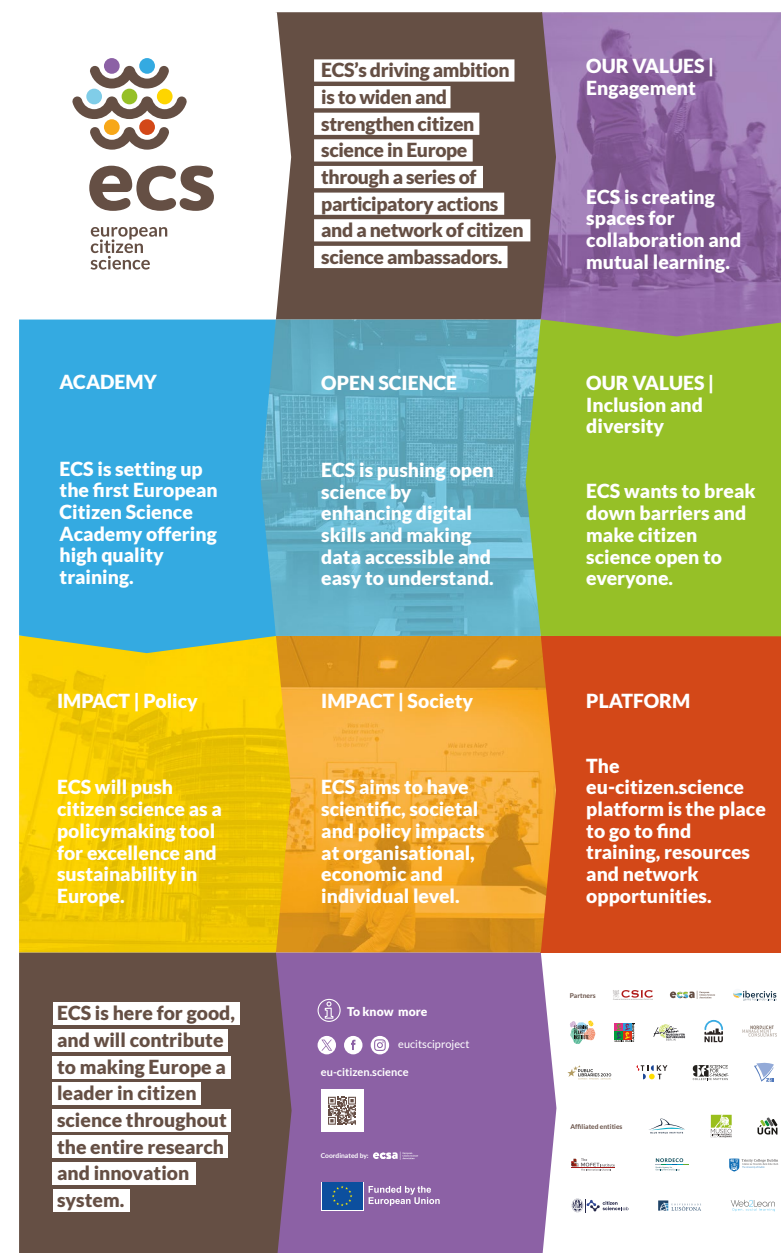


Figure 1. The ECS project at a glance



Web

https://eu-citizen.science/ecs_project/

The ECS platform

<https://eu-citizen.science/>

The ECS digital magazine *Citizen science lighthouse*

<https://eu-citizen.science/subscribe/>

Social media



E-mail

eucitsciproject@ecsa.ngo



Section 1



Social Inclusion

How to achieve
diversification in
citizen science

Older adults join citizen science: insights from Spain's OdourCollect



ECS partner Science For Change from Spain was responsible for the implementation of an inclusive pilot that involved older people in the usage of a citizen science app for the mapping of odours. 30 older people from three different locations shared their concerns with using a mobile app and brainstormed on solutions to overcome barriers to their involvement in citizen science projects. The pilot applied an innovative artistic approach to overcome some of the barriers related to technology and has not only generated a comprehensive guide on how to involve older people in science, but also outlines benefits for the people involved.

Science For Change is a social enterprise based in Barcelona that promotes collaborative research, evidence-informed public policy and quality scientific communication.

More info: <https://scienceforchange.eu/>

OdourCollect is a citizen science application that puts odour pollution issues on the map, giving a voice to citizens affected by odour issues. The application has been implemented and used since 2019 and now provides citizens' contributions on odour pollution from around the world.

<https://odourcollect.eu>

The inclusive pilot presented by Agostina Bianchi and Mireia Ros of ECS partner Science For Change (SFC) built on the citizen science project "OdourCollect and the elderly: digitising and co-creating our olfactory memory". In this innovative initiative, older people were actively involved in the mapping of odours and odour pollution through the use of a mobile application. This project targeted older individuals specifically, since they typically show low engagement in such technological and scientific activities. The overarching aim was to identify and address barriers to their participation, culminating in the creation of a comprehensive guide with recommendations for incorporating older populations in citizen science projects.

With financial support from FECYT, the The Spanish Foundation for Science and Technology, the project unfolded in three distinct Spanish locations: Barcelona, Vilanova i la Geltrú, and Ataun, engaging a total of 40 participants. Each setting offered unique insights into the challenges and opportunities of involving elderly citizens in citizen science.

In Barcelona, the initiative was integrated into a local civic centre's science week, attracting individuals with varying degrees of scientific background, including retired professionals. The participants' interaction with the app highlighted technological adeptness among the younger seniors (aged 60-70) but significant challenges among those over 70, many of whom lacked smartphones.



Figure 2. Pilot in Ataun. A journey through time into olfactory memory. (credits: Mikel Blasco)



Figure 3. Pilot in Ataun. Collaborative timeline of olfactory memories. (credits: Mikel Blasco)

“One day we walked around the neighbourhood, we used the app, we showed the participants how to use it and we recorded all the limitations they had in the usage,” explains Agostina Bianchi. “So the biggest limitation for working with these groups is technology because nowadays it’s immersed in everything we do. And we

could see a big difference between people between 60 and 70 years who have to use it, and people who are older than 70, who find a lot more difficulties in using new technologies because most of them don’t even have smartphones. And they’re not quite interested actually in learning how to use this new technology. But they are interested in being included in other things, in other activities.”

The citizens involved in the small city of Ataun came from an organisation for people aged 65+ and had a similar profile to those in Barcelona, while in Vilanova i la Geltrú the pilot engaged older people from a geriatric residence, resulting in additional factors to be considered to have a successful intervention.

Driving factors and successful interventions

The project faced several barriers, notably the varying degrees of cognitive and physical abilities among participants, especially in settings like the geriatric residence. Some participants suffered from conditions such as dementia, were wheelchair users, or had other physical limitations which limited their ability to engage with typical citizen science activities and im-

peded e.g. the use of a mobile phone. The Science For Change team identified some key elements to address these barriers:

Technological adaptation and support

The project team adopted a hands-on approach to discover usability issues with the app. They facilitated direct interaction with the app through guided neighbourhood walks, which helped pinpoint specific usability issues. This hands-on approach was crucial for developing practical modifications to the app, enhancing its accessibility for older users. Participants who did not possess a mobile phone could use mobile phones provided by the Science For Change team.

Artistic engagement

A particularly innovative aspect of the project was its use of art to bridge the gap towards scientific activities for older participants. In workshops focused on the emotional connections to odours, participants created art pieces that expressed their personal stories and relationships with specific scents, culminating in a virtual museum exhibition.

Says Agostina: “In another session, we talked about how odours are related to memory and emotions. And we did a collaborative timeline in which they were able to share their memories, linked with odours from their personal stories. So we engaged them in a conversation, and then they chose a material to materialise all these memories in art. And we created a virtual museum. So this was a way for them to tell us about their stories through the odours and to create a conversation on that, and what they knew about science and how they would like to be included.”

Support by local organisations

It turned out to be very important that representatives of e.g. the civic centre in Barcelona or the geriatric centre in Vilanova i la Geltrú supported the

process. Agostina explains: “It is very important to engage people from entities and organisations who are used to working with older people because they know them and they know their needs. They can make them feel more comfortable. They know: this participant likes that, this participant can not do that. They can suggest how to adapt activities to the concrete needs and requirements of the involved participants.”

Enhanced social interaction

The project's social component was particularly effective. Participants valued the opportunity for social interaction, which was facilitated by group activities and discussions. This not only enhanced their engagement with the scientific aspects of the project but also provided a valued sense of community and belonging.

Flexibility in implementation

Adapting activities to suit participants' physical and cognitive capabilities, especially in geriatric settings, ensured that all could participate meaningfully. Activities were designed to minimise writing and maximise hands-on involvement, with staff deeply engaged to assist those unable to participate independently.

Outcomes and reflections

Many participants valued and benefited from the opportunity to connect with others and share their experiences. In addition, it was very important for the community to be heard and voice their opinions. The topic of odours was relevant for those living in the city and outside of the geriatric centre.

Agostina summarises the main benefits for participants as follows: “The most important benefit for participants was the social aspect, to be able to participate with other people, to talk, to be heard, to be valued. Some of

them were interested in science so they were happy to be included, as they had this feeling of being left aside. They mentioned many times that they would like to have spaces to be heard and to talk. Not just to do things, but exchange opinions and talk. They also shared a lot of concerns about odours in the city. So people from the first pilot found it very relevant, but technology was the barrier. The artistic part was a lot of fun too.”

That the OdourCollect inclusive pilot was successful in engaging older participants can largely be attributed to the tailored strategies, which addressed both the technological and social needs of the demographic. By fostering an environment that valued their contributions and adapted to their limitations, the project not only improved the accessibility of citizen science for older people but also enriched their social and emotional well-being. The scientific insights from the innovative co-design process directly informed the development of the guide *Guía de recomendaciones para la inclusión de personas mayores en proyectos de ciencia ciudadana* published in Spanish on Zenodo, which serves as a resource for integrating older people into similar projects in the future. Overall, the project provides a valuable model for future initiatives aiming to engage underrepresented groups in scientific research, demonstrating that with thoughtful adaptation and a focus on social connectivity, older citizens can actively contribute to and benefit from citizen science.

Seniors embrace biodiversity research: a Viikki Library experience



Viikki Library in Helsinki is a member of LIBER, a network of European research libraries and a cooperation partner of ECS. In this context, Viikki Library implemented an inclusive pilot that embarked on an innovative journey to make citizen science accessible and engaging to traditionally underrepresented groups in scientific activities, particularly seniors and unemployed people. Leveraging nature-based activities to draw these groups into the world of citizen science, the pilot resulted in an enthusiastic participation of citizens during the walks, an increased awareness for biodiversity research, and new biodiversity data for scientists.

Viikki Library is located in the Viikki campus area of the University of Helsinki. Located close to nature, nature and science are also highlighted in the library's numerous events and in its slogan: A green and lively library close to nature.

<https://directory.libraries.fi/helsinki/viikki-library>

Viikki Library in Helsinki is a public library serving both the community and the University of Helsinki. The library engages in numerous collaborative efforts with local organisations. For instance, Avoin Työtoiminta provides rehabilitative work activities and social rehabilitation for long-term unemployed individuals and those with impaired work capacity in Helsinki. Viikki

Library collaborates with Avoin Työtoiminta for participation in the Finnish Environment Institute's (Syke) campaign, where they collect trash from the beach, provide research kits for borrowing to library patrons, and report all findings to Syke.

As part of Viikki Library's collaboration with the Finnish Museum of Natural History, library patrons can borrow tickets to the museum, book talks for adults and pop-up libraries are organised at or in collaboration with the museum, and the library often invites experts from the museum to its events. One such event is the **Great Nature Night**, organised in partnership with the Finnish Museum of Natural History and the Helsinki Nature Conservation Association, and hosted by the popular nature journalist Paul Segersvärd.

Viikki Library furthermore organises **Nature walks** that take place in the vicinity of the library and employ the iNaturalist app to help identify birds and plants. While these walks are open to everyone, seniors and students are usually the main participants. Another format employed by the library are **Nature book walks**, which happen in the Kaisaniemi Botanic Garden.

In an interview, Tuula Rönkä from Viikki Library shared her insights from this diversity of citizen science approaches based at a public university library.

Project design and community engagement

The library recognised early on that traditional, indoor presentations on citizen science might not have a broad appeal, particularly to those unfamiliar with or disinterested in science. This insight led to the development of nature book walks and nature-focused events that offer hands-on, practical experiences in local biodiversity through the use of the iNaturalist app.

These activities were designed to be physically accessible and paced to accommodate all participants, especially seniors, ensuring that no one was excluded due to physical limitations.

iNaturalist is a social network for sharing biodiversity information to crowdsource observations about nature. It is one of the world's most popular nature apps and helps its users to identify the plants and animals around them while generating data for science and conservation.

<https://www.inaturalist.org/>

Strategic collaborations

The initiative was notably enhanced through strategic partnerships, particularly with the Finnish Museum of Natural History. These collaborations were instrumental in organising major events like the Great Nature Night at the museum and pop-up library installations in the Kumpula Botanical Garden.

Inclusion of underrepresented groups

The library put an additional effort into engaging seniors and unemployed people, which stemmed from an identified need to engage these groups more actively in community and scientific activities. In addition, the inclusion of often underrepresented groups is also sought due to the personal investment of staff members who have identified a need for active engagement of this kind. The library utilised various engagement methods, including integrating eco-social education into existing social support structures for the unemployed, and aligning citizen science activities with social events like movie groups for seniors. This approach made citizen science both more accessible and more relevant to these participant groups' daily lives.

Engagement methods and adaptations

To effectively engage these groups, the library employed several innovative strategies.

Adaptive activities: Nature walks were set up in a way that met the people where they are. They were also kept short and required no personal equipment, as the library provided tablets and phones loaded with the necessary apps.

Tuula Rönkä explains: "I think we also have to be active and talk outside the library. We have to go where the people are. For example, we had our Nature Book Walk in spring in the Botanical Garden here in the city, and during these walks we could also talk to people and motivate them to join our other citizen science activities."

Social media and community outreach: Active use of platforms like Facebook and Instagram helped reach a broader audience, while direct community engagement ensured that those less likely to visit the library could still participate.



Figure 4. Bird watching in Nature Walk Viikki Library (credits: Helsinki City Library)

Event hosting and celebrity involvement: Hosting events with popular figures, such as well-known nature journalist Paul Segersvård, attracted larger crowds and increased interest in library activities.

“We have the Nature walks, and in September we have the Great Nature Night at Viikki Library, and we have a popular, familiar nature journalist as a host of the event. He is really popular and seniors really want to see him. We have to be creative, as you can imagine,” says Tuula.

As such, the library tackled the identified barriers to accessibility by transforming citizen science into a dynamic, outdoor, and interactive experience. Time constraints and resource limitations were significant, yet the dedicated library staff and effective partnership networks mitigated these challenges. Ongoing efforts to reach out directly to community groups and tailor activities to their interests and capabilities proved essential in maintaining engagement. This feeds into the overall efforts libraries have to extend in order to motivate people of any age and background to use libraries as a resource, making citizen science activities an extension of sorts for the ongoing task of making the library an attractive place for all citizens.

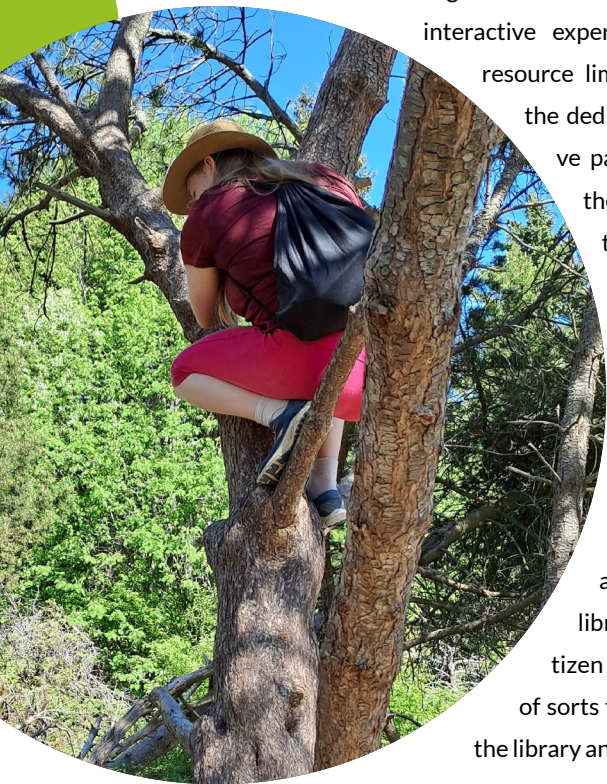


Figure 5. Many university students participated in Nature walks (credits: Helsinki City Library)

Figure 6. Nature Walks were really popular in Viikki Library (credits: Helsinki City Library)

Impact and future directions

The success of the project is evident in the enthusiastic participation during the Nature walks, with participants contributing to biodiversity data collection using the iNaturalist app. Anecdotally, many participants continued to use the app independently, indicating a lasting impact beyond organised activities. Viikki Library's initiative not only promoted biodiversity awareness but also enriched community life, particularly benefiting those who might feel excluded from scientific or academic pursuits.

This approach to citizen science exemplifies how libraries can serve as catalysts for inclusion and educational enrichment. By moving beyond traditional settings and embracing community-based, interactive science activities, the library has not only broadened the scope of citizen science but also enhanced its role as a community hub, fostering an inclusive and scientifically engaged public.



Bridging generations: seniors and teens unite to explore Latvia's place names



In Latvia, public libraries are pioneering the engagement of groups often sidelined in citizen science activities, specifically seniors and teenagers. This innovative project, centred on collecting local place names, leverages the rich storytelling traditions of Latvia to engage these under-represented groups, merging local heritage with the global movement of citizen science. The results of this approach are a lavish collection of local place names and insights on how to engage older adults in scientific research via a public library.

The study of **toponyms** (proper names of places) is the study of **place names** or geographic names and includes their origins, meanings and usage. Place names can be names of e.g. fields, regions, routes, forests, inhabited locations, and urban elements. Probably the first toponymists were the storytellers and poets who explained the origin of specific place names as part of their tales. The Place Names Database in Latvia maintains information on place names (official and unofficial ones), the type of geographic feature, administrative affiliation, location, but also data sources (like maps or narrators), quotes, and more detailed description of the name.

<https://www.lgia.gov.lv/en/place-names-database-0>

Valmiera Library is an institution of the municipality of Valmiera, Latvia, and part of the PL2030 network, which is a partner of the ECS project. The library's mission is to enrich the life of the local community and sensitively respond to changes in the cultural, educational and informational needs of society.

<https://biblioteka.valmiera.lv/>

In Latvia, 32 public libraries implemented a project that involved seniors and teenagers in the collection of local place names. To capture the inspiring lessons learned from this approach, we conducted an interview with Alīna Pūce, Librarian at the Valmiera Library. Alīna participated in the two-day ECS training on citizen science, organised in May 2024 and specifically targeting public libraries that are interested in this innovative research approach.

Project background and design

The citizen science initiative at Latvia's public libraries was introduced as part of an effort to involve groups typically less active in such projects. Recognising that seniors often participate in library storytelling events and that teenagers are generally less engaged in library activities, the project was designed to collect place names, which is also the library's "topic of the year" and has historical roots in the community but had not previously been labelled as citizen science. The engagement spans 32 libraries in the region, allowing participants to contribute place names and associated stories throughout the year.

"We do a lot of activities on storytelling. Last year it was about peoples' names and surnames and this year we have storytelling events about place names. So right now we kind of have an ongoing process in all 32 public libraries in our region. We're collecting place names in a free form where everybody can come to the library, write down all of the place names that they know

from their local places and tell stories about them. Usually, seniors are coming to these events, but we're doing a separate thing with teenagers trying to tell them more about what citizen sciences is and how collecting place names can contribute to research and to language development and things like that," explains Alina.

Strategies for social inclusion

The libraries employed several strategies to ensure the inclusion of seniors and teenagers in the citizen science activities.

Tailored engagement: For seniors, the project minimised technical explanations of citizen science, focusing instead on the storytelling aspect, which naturally aligns with the older peoples' personal interests and strengths. In contrast, teenagers received a more detailed introduction to citizen science to help them understand its relevance and potential impact.

Adapted technological engagement options: For the older generations, pen and paper are used to document the stories, so that they do not need to apply any technological interface to add their stories to the place name database. At the same time, younger people were given the option of entering their place names directly to the database.

Personal outreach: Librarians utilised personal contacts to engage seniors in smaller towns, often speaking directly to them about the project. This personal touch significantly boosted participation among seniors.

Utilising existing platforms: Information about the project was disseminated through local newspapers, library web pages, and social media platforms. However, personal invitations were noted as the most effective method of encouraging participation.

Drivers and barriers

The sense of community and belonging strongly motivated seniors, who appreciated the opportunity to discuss and document local knowledge.

"I think their motivation is the local community and the sense of belonging.

This is something that we're very much working on

here, because that's something that mo-

tivates the elderly people when

they can talk about their pla-

ces, their families, their

people around them,

so that is a very good

topic to give them.

It always motiva-

tes them to come,"

tells Alina from her

experiences, and

adds: "Of course,

when you have a

small library then

the librarian knows

everybody that comes

to the library and basically

knows everybody that lives

there in the local area. So there

are personal contacts and you can get

them into conversations on the street and invite

them to the event."



Figure 7. Seniors sharing their stories about local places.
(credits: Valmiera Library)



Figure 8. Teenagers sharing their place names on a tour around Valmiera. June 19, 2024 (credits: Valmiera Library)

Motivating teenagers proved challenging, with only a small number becoming involved despite various outreach efforts, as Alīna explains: “For teenagers, that may be a hard subject. It is very hard to motivate teenagers to get involved in activities. Yet we managed to get some 10-12 teenagers to involve themselves in this project.” The broader societal trend of declining library attendance posed additional challenges, indicating a need for libraries to adapt to changing community engagement patterns. Something that proved valuable in motivating teenagers was the involvement of their peers, particularly through a youth programme that has been part of the library’s offerings for several years.

Reflections and future directions

The project has produced a rich collection of local place names, now integrated into a national database. This outcome does not reflect individual contributions by age group, but it captures the essence of local heritage as preserved by different generations. For seniors, the project provided a platform to record and validate their knowledge and stories, while teenagers contributed by digitising this information, thus bridging the gap between traditional knowledge and modern technology.

The success of the place names project in fostering participation of groups who have so far been less involved in citizen science, and has inspired Lat-

vian libraries to consider more nature-related citizen science activities. The recent participation of library staff in the ECS training on citizen science has further equipped them with the knowledge to expand these initiatives. Although challenges remain, particularly in engaging younger demographics, the project has highlighted the potential of citizen science to foster significant community engagement and intergenerational collaboration.

“Right now it is a struggle to get people to come to the library. Society seems to be changing and the library is always trying to keep up and adapt. There are some things that are working well — like the storytelling events for the elderly to share something local and personal of their interest.” concludes Alīna.

Latvia’s public libraries have demonstrated that citizen science can be an effective tool for including especially older generations in citizen science, as well as for engaging seniors and teenagers in meaningful activities that contribute to both scientific and cultural knowledge bases. By continuing to tailor their approaches to meet the unique needs and interests of these groups, the libraries can enhance their role as vital community centres that bridge the gap between science and society.

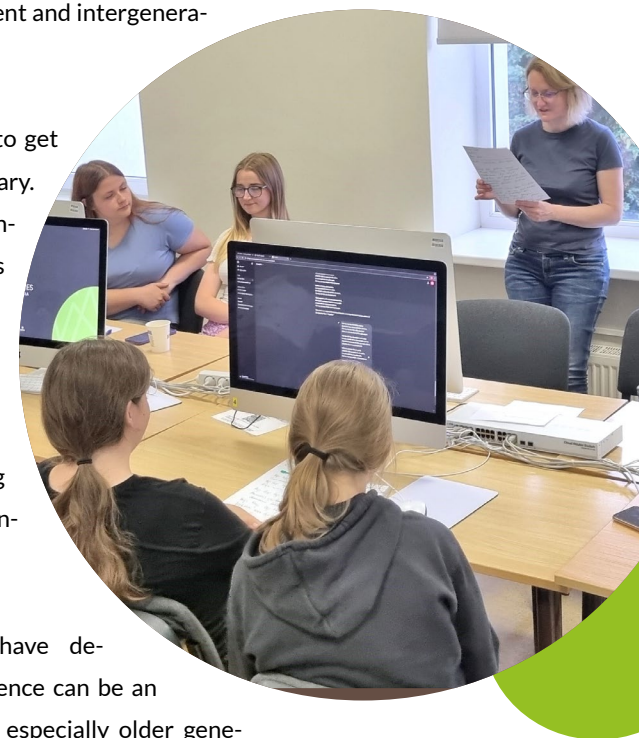


Figure 9. Teenagers learning AI tools and developing stories about place names (credits: Valmiera Library)

Empowering teens to protect nature: Berlin students monitor biodiversity



The Natural History Museum Berlin organised a BioBlitz event specifically designed to engage students from an integrated secondary school, with the group entailing young people with migrant or refugee background, as well as those with learning difficulties and cognitive challenges. Implemented in close collaboration with teaching staff, a group of thirteen year old students were taken on a field trip which allowed them to engage with their immediate environment while contributing to broader biodiversity monitoring efforts. This event generated important learnings on how to involve this target group and manifold benefits for those involved, as we learned from the BioBlitz team Marius Oesterheld and Julia Rostin.

The **Natural History Museum Berlin** is an integrated research museum located in Berlin, Germany, with a mission to discover and describe life and earth – with people, through dialogue. The museum is currently involved in developing the Citizen Science Center for Nature, Sustainability and Digitalization

<https://www.museumfuernaturkunde.berlin>

The BioBlitz was conceived as a standalone event rather than part of an ongoing citizen science project and took place in June 2024 in Berlin. The Natural History Museum focused on engaging 20 students, most of them

aged 13 years, from an integrated secondary school known for its diverse student body, including many who face barriers to educational success such as language barriers and cognitive challenges, as well as differing levels of emphasis placed on education by parents and guardians.

“Students at this kind of school hardly ever participate in citizen science projects. They are also underrepresented as a target audience of other types of science outreach activities.” says Marius Oesterheld, researcher at the Natural History Museum and co-organiser of the BioBlitz.

Project design and implementation

The event involved a preparatory phase where the Natural History Museum Berlin collaborated closely with a teacher from the school who was already interested in citizen science. This teacher played a crucial role in facilitating the involvement of the school and ensuring administrative approval. He also supported the Museum für Naturkunde team in adapting the BioBlitz event to the requirements and needs of the students. Preparatory materials, including a short information sheet for parents and students, and a gamified bingo sheet, were developed to make the event engaging and accessible.

The actual BioBlitz took place in an urban park in Berlin, called Freizeitpark Marienfelde, and known for its exceptional biodiversity, where students spent approximately two hours exploring and documenting local flora and fauna using tablets provided by Museum für Naturkunde.

“The BioBlitz for all of us was an experiment. We hadn't done anything like this before and we agreed that the main goal was to make this into a fun experience for everyone. So we just wanted everyone to have fun and connect something positive with this whole citizen science and biodiversity topic,” explains Marius Oesterheld, researcher at the Museum für Naturkunde.

Engagement and inclusion strategies

The engagement strategies were carefully tailored to meet the needs of the participants.

Simplified communication: The complexity and intensity of explanations regarding the concepts behind citizen science and the importance of biodiversity monitoring were reduced in communications with students. Instead, the focus was on hands-on activities and direct engagement with nature.

Group work: The students were divided into groups of 4 which were put in a playful competition with one another to finish their bingo cards first. In their feedback, the students reported that they really enjoyed the group work. The specific make-up of each group was chosen by the teacher, based on his knowledge of group dynamics in the class. This was a very important input seen as crucial to the success of the activity.

Technological integration: The use of tablets with the iNaturalist app pre-installed made the citizen science activity dynamic and interactive. It provided instant feedback to the students when they uploaded their observations and simplified the identification process of flora and fauna, which was crucial for keeping the students engaged and motivated.

Supportive environment: The high ratio of adults to young people was also beneficial, with the group being accompanied by several adults, including teachers and Museum für Naturkunde staff with expertise in biodiversity. This ensured adequate support and supervision, allowing students to explore safely and ask questions freely.

Clarity of roles: Due to the abundance of adult supervisors with different expertise, each team member could focus on their area of expertise, be it bio-

diversity expertise or pedagogical questions and issues in group dynamics, to the benefit of the overall success of the activity.

Trustful relationships: The good relationship between the students and their teacher was positioned as especially advantageous, positively impacting the mutually respectful yet somewhat relaxed collaborative work, for instance allowing the young people to ask questions quite freely.

iNaturalist is a social network for sharing biodiversity information to help each other learn about nature. It is one of the world's most popular nature apps and helps its users to identify the plants and animals around while generating data for science and conservation.

<https://www.inaturalist.org/>

As such, key drivers of success included the use of gamification to spark a competitive spirit in a non-aggressive way, the integration of technology to provide quick feedback and gratification for the students' efforts, and the physical activity involved in exploring the park. The collaborative group work and the scenic nature of the park also significantly enhanced student engagement. At the same time, certain challenges to working in such a setting became evident, although none of them broke the activity. One important aspect in this regard was managing the diverse needs of students, particularly those with behavioural or learning difficulties. The logistical aspects of organising such an event, including coordinating transportation and managing time effectively, also posed challenges.

It was essential to have approval from relevant decision-makers, as Marius notes: "I mean, this is kind of counterfactual now because it did work out well in our case, but I guess having a headmaster that is kind of resistant to novel ideas or excursions in general, and there are headmasters that are really hesitant about that sort of thing, or having teachers that feel that this



Figure 10. Teens taking part at the BioBlitz at the Freizeitpark Marienfelde, Berlin (credits: Kim Mortega, Museum für Naturkunde Berlin)

is additional work for them and they can't really be bothered, or also teachers that are not allowed to spend several hours away from school doing stuff that is not directly linked to the curriculum would really make this more challenging.”

Outcomes and impact

The BioBlitz was considered a success by all involved, leading to a desire to repeat the event in the future. For the students, the event provided a rare opportunity to engage in scientific inquiry in a real-world setting. The data collected contributed to a broader citizen science database, with 40 contributions achieving “research grade” so far, which means that they meet all the requirements to be used by scientists all around the world and are automatically added to the GBIF (Global Biodiversity Information Facility) database.

GBIF - the Global Biodiversity Information Facility - is an international network and data infrastructure funded by the world's governments and aimed at providing anyone, anywhere, open access to data about all types of life on Earth.

<https://www.gbif.org>

The BioBlitz event also highlighted several important aspects of social inclusion:

- **Co-creation of activities for the target group:** The event was co-designed with a teacher who was very knowledgeable about the target group. Through this, it was made highly accessible and fun for students from diverse backgrounds, providing a low threshold for them to get involved in a new and meaningful form of engagement with science.
- **Empowerment through participation:** By actively involving students in citizen science activities, the event empowered them to contribute to scientific knowledge and learn about the biodiversity in their immediate urban environment, fostering a sense of achievement and belonging, and opening up new areas to them. This was registered both by their teacher and in a final feedback conversation at the end of the activity. Marius adds: “I think it was a really nice spot and none of them had ever been there. There's a hill in that park from which you have a fantastic view of the whole city. Most of them spent quite some time on the hill at first and just looked where their house is and where the school is and where you can see the city centre and that sort of thing.”

Figure 11. Team photo of the BioBlitz at the Freizeitpark Marienfelde, Berlin (credits: Kim Mortega, Museum für Naturkunde Berlin)



- **Educational enhancement:** The event complemented traditional education by providing hands-on learning experiences, which is particularly valuable for students who may struggle in more conventional educational settings: “The teacher insisted that they needed gadgets, there needs to be instant gratification. And some of them are not great at reading yet. So I think that was definitely a very good decision to have tablets and the iNaturalist app, and the binoculars were also very popular. If it had been just pen and paper, and if they had to look up stuff in brochures and identification books, I think it wouldn't have worked that well,” says Marius.

Through all of this, the Museum für Naturkunde's BioBlitz serves as an example of how citizen science can be leveraged to enhance social inclusion and educational outreach. By adapting citizen science activities to the needs of underrepresented groups, such initiatives can enrich scientific research while fostering a more inclusive, informed, and engaged community. This event underscores the importance of thoughtful engagement strategies and the necessity of supporting diverse participation in citizen science for the mutual benefit of science and society.

Climate resilience in Spain: listening to all voices



Spanish ECS partner Ibercivis involved underrepresented groups in focus group discussions aiming to upscale adaptation processes for building a climate resilient Europe. They engaged people with a migration background, women aged 65+, young people and workers, who are traditionally further away from tertiary education and academic contexts, in the discussion of climate change adaptation and how to combat disinformation on climate change. The diversified outcomes of this process show how important the engagement of diversified societal groups is for a comprehensive approach to climate adaptation challenges.

This inclusive pilot, implemented by Lucía Moreno and her team at the ECS partner organisation Ibercivis as part of the AGORA project, represents an innovative measure towards integrating diverse societal groups into citizen science. Aimed at enabling climate change adaptation and preventing climate related disinformation, AGORA has effectively engaged underrepresented communities, including older adults and migrants, in meaningful scientific dialogue and action. This collaboration between ECS and AGORA provides valuable insights for the AGORA Spanish pilot, particularly in terms of engagement and reaching multicultural communities. This activity is one of the seven inclusive ECS pilots that seek to boost inclusion and diversity in citizen science by providing advice to the projects that are part of the ECS

inclusive pilots. In addition, the ECS project carried out an impact assessment for the participants in the focus group.

Ibercivis is situated in the city of Zaragoza, Spain. It was established as a foundation in 2011 and aims to implement, promote and study citizen science, both in Spain and in Europe. Since its formation it has supported the implementation of 80 citizen science projects.

<https://ibercivis.es>

The **AGORA project**, set to conclude in December 2025, supports the overall objectives of the EU Mission on Adaptation to Climate Change. AGORA aims to apply transdisciplinary tools and approaches to effectively engage European communities and regions in climate actions, upscaling adaptation processes to support developments towards a climate resilient Europe. It encompasses four European pilot regions in **Sweden, Germany, Italy and Spain**. <https://adaptationagora.eu/>

Pilot design and thematic focus

The pilot design is centred on inclusivity, with tailored strategies to ensure the engagement of groups often excluded from scientific discourse. The project leverages a combination of a localised workshop and targeted focus groups to foster an inclusive environment where all participants can contribute effectively. Within the Spanish pilot of the AGORA project, the work of inclusiveness of the activities was done following the strategies of the ECS project.

In Spain one specific workshop and three focus groups for distinct demographic segments were conducted on various aspects of climate change

adaptation, necessitating slight adaptations in formats to effectively reach each participant group:

- Young people aged 16-25 years: here, engagement efforts were designed around academic schedules to accommodate their availability.
- Working adults aged 25-65: this group was reached through collaborations with the Aragón Open Governance Laboratory, leveraging existing networks and digital platforms.
- Women over 65: this group was recruited in rural settings. This was the only activity that did not follow the focus group model, through a workshop the activities were adapted to include more participants due to high demand, reflecting a strong desire among older women to make their voices heard and contribute to meaningful activities with positive impact on their communities.
- People with migration background: special focus groups for migrants from Latin America were facilitated by leveraging existing community connections, such as a Venezuelan co-worker well-connected within the migrant community. This pre-existing relationship also served to enhance trust and participation.

Figure 12. Fabaroles Women's Association participating in the focus group (credits: Ibercivis)



These sessions allow participants to co-design soft adaptation solutions by specifying climate-related challenges and proposing tailored solutions, ranging from urban greening initiatives to the establishment of climate refugee centres. They are also engaged to co-evaluate participatory methodologies.



LAAAB - Aragón's Open Governance Laboratory - encourages citizen participation in the design of public policies: laws, plans and programmes. It is a meeting place between regional government and civil society, a place to cooperate, reflect and experiment together on finding solutions to common challenges.

<http://www.laaab.es/>

Figure 13. Fabaroles Women's Association talking (credits: Ibercivis)

Drivers of inclusion

The main drivers facilitating social inclusion in the Spanish pilot of AGORA included various actions.

- **Community connections:** Utilising personal and professional networks within communities, especially for engaging migrants and other vulnerable groups.
- **Institutional support:** In one rural area, links to older female participants were established through an organisation for retired women which supported the recruitment efforts by connecting the AGORA to its members. For the involvement of a group of workers in the pilot, the Aragon Open Governance Laboratory supported outreach making use of its very strong communication channels.

- **Adaptability and responsiveness:** Flexibility in planning and responsiveness to community interest and feedback were critical in ensuring the relevance and success of the initiatives.

As Lucía Moreno of Ibercivis explains: "It was not easy to establish contact with the migrant community. Our initial outreach efforts focused on large NGOs or local ones. However, a breakthrough came through Marianna Martínez Alfaro and Susana Barriga, two Venezuelan co-workers from the Aragon's Open Governance Laboratory. As community leaders, they played a pivotal role in connecting us with the target population."



Figure 14. Migrants focus group in Zaragoza (credits: Ibercivis)

Barriers to inclusion

Despite the project's success, several challenges impacted the success in making the engagement efforts inclusive,

- **Scheduling conflicts:** Engaging younger participants, aged 16-25, was particularly challenging due to their school schedules and academic commitments.
- **Language barriers:** To overcome potential language barriers in working with migrant communities, Ibercivis decided to work with migrants from Latin America.

- **Resource limitations:** At the beginning, a collaborating NGO inquired whether participants were going to be reimbursed for their efforts. This highlights a recurring challenge on resources needed to facilitate engagement.

Impact and reflections

The pilot has empowered groups that are normally underrepresented in citizen science activities, to contribute actively to solutions that directly affect their lives. The participating older women, in particular, appreciated the opportunity to share their experiences and insights, which are often undervalued in other contexts.



Lucía shares her insights: “So the motivation between those two groups of migrants and older women were a bit different. The women felt their voices were usually not heard and they wanted to do something new, to participate. They had a really intrinsic motivation. And the migrant group was attracted by this personal contact. We invited them by having a cup of coffee for the climate. They also know the different hazards we have with climate change, so they are already engaged with the topic and they want to participate because of that too.”

Figure 15. Migrants focus group in Zaragoza (credits: Ibercivis)

The project’s innovative engagement strategies, such as leveraging personal contacts within migrant communities and adapting focus group formats to meet participant needs, have been crucial in its success. These approaches have facilitated a deeper understanding of the diverse ways different groups perceive and are affected by climate change, leading to more effective and inclusive adaptation strategies. The outcomes show that different stakeholder groups have different concerns related to climate change: while the younger ones living in comparatively small lodgings were most concerned about heat waves, the stakeholders from rural communities were more worried about flooding.

And when being asked how the participants wanted to be actively engaged in climate actions and information about climate change, there were differences observable as well: “The workers wanted to have climate assemblies that we don’t have in Aragón. The youths wanted more to have music acts and festivals that raise awareness about climate change — explains Lucía. — And the women wanted to have more workshops in the village and to have stands in the street to see more cases about climate change adaptations and the things you could do as an individual to recycle, putting solar panels in your house, etc.”.

The ECS inclusive pilot that is built on the AGORA project gives a good example of principles to follow when involving underrepresented groups in scientific processes. The diversity of outcomes from the involvement of these stakeholders shows that science can strongly benefit from the active engagement of different societal groups to find adapted solutions for today’s pressing societal challenges. By continuing to tailor its approaches to the needs and preferences of underrepresented groups, AGORA not only enriches its scientific outcomes but also supports a more inclusive, informed, and engaged community ready to face the challenges of climate change.

Croatia's fishing community tracks large marine vertebrates



Blue World Institute, the Croatian partner of the ECS project, initiated activities that aimed at bridging the gap between marine scientists and fishing communities, a group traditionally seen as separate from wildlife conservation efforts. They advanced its 30 year long history of data collection on sightings of large marine vertebrates, like dolphins and sea turtles, via the app Marine Ranger. The initial challenges for involving the fishing community in the usage of the app were significant, but resulted in an enriched collection of research data actively used for policy-making and the cultivation of a sense of stewardship among the fishing communities.

Blue World Institute of Marine Research and Conversation (BWI) is an independent non-profit organisation founded in 1999. Its aim is to carry out scientific research and conversation of the marine environment as well as educational activities with an emphasis on the Adriatic Sea.

<https://www.blue-world.org>

In the coastal waters of Croatia, the ECS partner Blue World Institute of Marine Research and Conversation (BWI) runs a citizen science project that transcends traditional environmental research by actively involving lo-

cal fishing communities, tourists and skippers in the collection of sightings of large marine vertebrates such as dolphins and sea turtles. Representing the longest ongoing research in the Mediterranean with 30 years of data collection, the Blue World Institute has been extending its portfolio of engagement options, most notably with the use of a mobile application called Marine Ranger as part of the ECS inclusive pilots. The introduction of the app aims at facilitating the collection of crucial data on animal sightings and behaviour, marking a significant addition to how environmental data are gathered and utilised for the purposes of marine conservation in the Adriatic Sea. This article presents some important learnings from the recent work done by the BlueWorld Institute, both in terms of barriers and drivers observed across their activities, as shared by Jelena Basta and Marinela Cukrov Car.

Marine Ranger is a citizen science application developed within the EU funded LIFE DELFI project (<https://lifedelfi.eu/project/?lang=en>), enabling the collection of information on opportunistic observations of live, injured or by-caught cetaceans (whales and dolphins) and other marine mammals.

https://play.google.com/store/apps/details?id=org.blueworld.marineranger&pcampaignid=web_share

Project design

The BWI activities were triggered by the need to extend engagement formats that bridge the gap between marine scientists and fishers, a group traditionally seen as separate from wildlife conservation efforts. Recognising the fishing community's crucial role in safeguarding marine ecosystems, the Blue World Institute leveraged an important meeting of local fishers on the island Lošinj to introduce the Marine Ranger app.

“It is very difficult for the fishermen to change their daily routines, so bringing up something new is always a big challenge — explains Jelena. — When we learned that they had a big gathering we took the opportunity to introduce the project and the app. And some of them showed an interest in using the app and now we are in the phase where we follow how often they use it and who uses it and how often they report when they see something.”

When the app is first accessed, users receive an educational introduction enabling them to identify certain species, but also outlining guidelines on how to approach marine wildlife and how to contribute to the preservation of the marine ecosystem. The submission of entries is based on the GPS data of the mobile phone, and can be amended with pictures and videos of the animals, as well as descriptions of their behaviour. The app presents an extension to existing engagement options like reporting sightings via (online) questionnaires or telephone calls to the Blue World Institute centre.

The long-term plan is to not to restrict the usage of the app only to the fishers on the island Lošinj but also to approach other fishermen on the Croatian coast. As such, the work on the island Lošinj serves as a pilot for a larger rollout to come in future.

Engaging fishers, tourists and skippers

The initial challenge faced by the Blue World Institute was substantial — changing the ingrained practices of fishers, who are often wary of new technologies and resistant to altering their routines, was no small feat. Most notably, fishing communities have a contentious relationship with certain large marine vertebrates.

“It is very crucial for us to accept that the fishermen are not happy normally when they see the dolphins. But more and more they understand that dol-

phins are part of the ecosystem and that everything is very interconnected, and when you lose one part then this will also destroy their fishing resources.” explains Jelena.

Thus, education and awareness raising is essential in shifting perceptions, helping the fishing community see dolphins not as competitors but as integral parts of a healthy marine ecosystem that could coexist with human activities. It is important to not only train fishers in using the app but also engage them in conversations about the ecological importance of dolphins and give them a chance to act as stewards for the wider Adriatic sea.

Figure 16. Dolphin watching educational tour with tourists (credits: Blue World Institute)



In the summertime the Blue World Institute also tries to focus more on collaborations with tourists and skippers. The connection to dolphin watching organisations turned out to be a very fruitful approach to engage tourists, as every participant receives an initial introduction into the appropriate behaviour when seeing the dolphins and also in the usage of the app. Tourists love to report their sightings as they feel being part of something big and helpful for the marine ecosystem. As Marinela notes: “We actually had very good responses from sailing boats and skippers that are really into nature and they would send us videos and picture materials where we actually managed to identify some rarely seen species in the Adriatic that we were aware that they exist, but now we actually had a proof.”

Barriers and drivers of participation

Combination of meeting formats

The motivation and ongoing engagement of fishers in the small, enclosed communities of the island Lošinj continues to prove challenging.

The team observed that the willingness individual fishers show in engaging in the project is dependent on the context, with group size being an important factor. Jelena says: “They are a very specific group. They tell you one thing when you have individual meetings, they tell you other things when they are in a small group, and again other things when they are in a big group.”

That’s why the Blue World Institute team decided to combine different types of meetings. They provide general information on the project

in bigger meetings with fishers, let participants process the information and then speak to them individually to keep engagement and attention high and specifically address individual concerns. Jelena also stresses how important this multi-pronged approach is to develop and maintain trustful relationships with the community: “Because if you do only individual interviews, then they start hiding. They feel like the others will see them and then it will look like they’re having some secret job with us. If you work only with the group, then you don’t get the truth out of them, the information that you want. So you have to be seen with everyone so they don’t feel like someone will tell them that they cooperate with scientists who protected dolphins.”

Usage of a portfolio of instruments

Despite the option of the new app the institute still sticks to the more traditional data collection methods and alternative reporting techniques like direct calls and interviews, ensuring that everyone could contribute regardless of technological proficiency.

Bi-directional communication

Another important driver of a long term relationship and engagement is the two-way communication between fishers and scientists. The app is a very nice tool that makes reporting easier, but when people share their sightings, the feedback of researchers is important to make them understand how essential their contributions are.

Marinela shares the swallowing story as an example of this important two-way communication between fishermen and researchers: “Yesterday we had another fisherman calling us. He told us that he had seen a very small dolphin in shallow water. He was worried that something was wrong with it and thought it was a baby without its mother. That’s why he called us. In the call I told him that this was a different, much smaller species that he was



Figure 17. Meeting with local fishermen on the island Lošinj (credits: Blue World Institute)

seeing. I explained to him that we had been following this dolphin for the last two years. This information changed something in the fisherman, he became part of the whole story.”

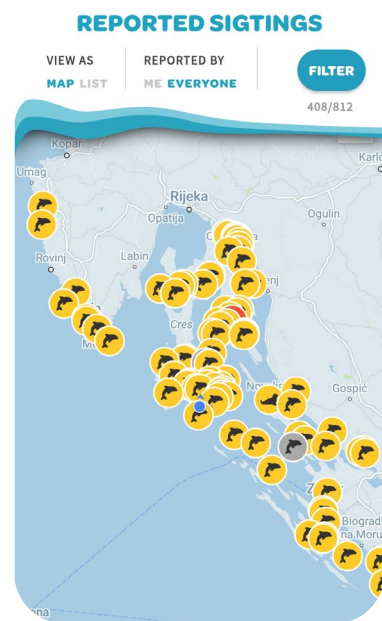


Figure 18. Overview of reported sightings on the Marine Ranger app. (credits: Blue World Institute)

Protection of animals

Another important aspect is protecting the animals while at the same time keeping track of them on the app. When users go to the app they can see a map with sightings. In turn, the app can also be used by tourists to find spots where dolphins and sea turtles are often sighted. To protect the animals and avoid everyone rushing to the same spot at the same time, the app is not reporting in real time but with a delay of 24 hours.

Broader impacts and future directions

The Blue World Institute in Croatia exemplifies how tailored citizen science initiatives can effectively engage traditional communities, transform environmental data collection, and foster ecological awareness and conservation.

The collected data are regularly reported to the Croatian public administration to provide policy-makers with high quality data and insights that shape future policies. Based on the Blue World Institute efforts, the waters of the

Kvarneric region were declared the first Dolphin Reserve in the Mediterranean Sea in 2006 and later became one out of six European Natura2000 sites for bottlenose dolphins. These are protected areas, some of them being part of existing nature and national parks. For those sites outside of nature or national parks, rules have still to be set on how to effectively protect the dolphins, and here again fishing communities are an important group to involve in creating ownership and stewardship for the conservation of these Natura2000 sites.

Natura 2000 is a network of protected areas covering Europe's most valuable and threatened species and habitats. It is the largest coordinated network of protected areas in the world, extending across all 27 EU Member States, both on land and at sea.

Another exciting outcome of the citizens-researchers collaboration is the detection of other cetacean species and an overview of their sightings. Finally, the citizen science approach not only enriched the collection of research data, but also cultivated a sense of stewardship amongst participants, which is especially important for the group of fishers. There is a slowly but steadily increasing interest and engagement amongst fishing communities observable over the last 10 years that is now facilitated by one more tool – the Marine Ranger app.

The success of the pilot project in Croatia serves as a promising model for other conservation efforts worldwide, demonstrating that with the right tools and community-focused strategies, citizen science can play a pivotal role in environmental stewardship and sustainable development. By continuing to adapt and refine their approaches, such initiatives can significantly enhance both scientific understanding and community participation in conservation efforts.

Providing Greenland's hunters and fishers a voice through citizen science



In the communities along the coast of Western Greenland, hunter and fisher communities have established a programme to document trends in the living resources and to propose actions to improve natural resource management. The community-based environmental monitoring programme PISUNA can create links between people residing in the rural areas who depend on living resources for their subsistence, and the authorities who are in charge of managing them. As one of the inclusive pilots of the ECS project, it shows the transformative potential of citizen science when it is driven by local communities, as Finn Danielsen, co-founder of the ECS partner Nordeco, stresses in an interview conducted to create this impact story.

Project design and implementation

Initiated by the Greenland Ministry of Fisheries and Hunting with the assistance of Nordeco and many partners, the PISUNA programme began in 2009 when there were increasing frustrations about the disconnect between the scientific advice on sustainable hunting quotas, the quotas set by the decision-makers, and the actual practices of hunters. At the time, there were limited efforts to listen to the observations, knowledge and perspectives of the hunters and fishers, and scientists' recommendations were often disregarded. To bridge this gap, PISUNA was designed to incor-

porate the firsthand observations and knowledge of hunter and fisher communities into the decision-making process and enhance the opportunity to come to agreements that are supported by all involved.

The goal of the **PISUNA** (Piniakkanik Sumiiffinni Nalunaarsuineq) Programme is to optimise the monitoring of living resources to inform decision-making through enhanced cooperation between fishers and hunters, government managers, and scientists, as well as through increased involvement of local community members in the monitoring. Observations and recommendations from PISUNA's Natural Resources Councils can be read in the searchable, web-based database PISUNA-net (<https://eloka.nsidc.org/pisuna-net/en/>) <https://pisuna.org/>

Nordeco, the Nordic Agency for Development and Ecology, is a Denmark-based social enterprise founded in 1990. It is wholly owned by the non-profit Nordisk Fond for Miljø og Udvikling, which promotes development and protection of natural resources through support of local, innovative initiatives. The organisation acts globally and conducts research, capacity building, and support of on-ground interventions to help protect and sustainably natural resources and the environment.

<https://www.nordeco.dk/>

Community monitoring groups, termed Natural Resource Councils, were established in various villages along the coast. These councils enable local hunters and fishers to systematically record and discuss their observations about wildlife and fish populations and environmental changes. They compile their insights on a quarterly basis and share their findings and recommendations with the municipal office as well as the Greenland association

of fishers and hunters (**KNAPK**). In this way, the hunters and fishers have an opportunity to have a 'voice' and directly influence policy and decisions on for example quota-setting and hunting seasons.



Figure 19. One of the village around the coast of Greenland participating to Greenland association of fishers and hunters (credits: Martin Enghoff)

“Every three months they sit down around a table in the village and discuss how it is going with the living resources, — explains Finn. — They compare observations of the same species from the same area one year ago and discuss if there is a change and if the change is important. If yes, they discuss what could be the reason for the change and if there is something to be done about it and who needs to do what and when. Then, they communicate this to the local, municipal office as well as to the association of fishermen and hunters in Greenland.”

Motivation, achievements and impact

The participation of hunters and fishers in PISUNA is entirely voluntary. Participation is driven by their own interest in having a say in important decisions regarding the living resources management.

“It is critical to this work that the incentive for the fishers and the hunters to engage is really to influence how living resources are managed, like quotas, hunting and fishing seasons or equipment they can use. — Finn states. — All these things are very important for the hunters and fishers. Being part of this process of management of living resources is so important. Instead of just being on the other side and receiving the quota, by being involved in the process, they can also have a say in what is happening.”

Some of the 500+ management proposals from the hunters and fishers have been used by the authorities but many have not yet. The success of community-based monitoring programmes like the PISUNA programme ultimately depends on whether the government uses the management proposals from the hunters and fishers, and when they don't, that the government staff report back to the hunter and fishers why they have not used their proposal. Finn explains: “What we typically see is that when community members are given responsibility, they become more restrictive about their own and others' use of resources, compared to when it's the government telling them.”

The program's efforts was internationally recognized when in 2018, local fishers and hunters of Attu community were awarded with the prestigious Nordic Council Environment Prize for their contributions to environmental monitoring and resource management. This acknowledgment not only celebrated their efforts, but also increased the visibility and credibility of the

community-driven natural resource management initiative. In the summer of 2024, this culminated in a visit to the village by Denmark's new king, Frederik X.

Sustainability and future directions

Despite its international recognition, institutionalisation of community-based monitoring into the Greenland government's governance processes remains a significant challenge. "If community-based monitoring is to be sustained, it will require that the government sets aside employee time and money and this is a long process," details Finn.

The PISUNA programme's approach can serve as a model for other regions, demonstrating the value of cross-weaving local knowledge and scientific research to enhance the ability of small rural communities to survive economically within environmentally sustainable limits. The initiative also underscores the importance of co-created citizen science, where community members are not just data collectors, but active participants in interpreting their own observations and contributing to decision-making. This approach can foster a deeper connection between communities, their environment, authorities and scientists and lead to more inclusive and sustainable resource management.

"There is a huge potential for engaging citizens much deeper in citizen science than we do today. The experiences from the Arctic could be used in many natural resource management initiatives — for example for an inclusive and effective operationalization of the EU Nature Restoration Law — in continental Europe," stresses Finn.

The PISUNA programme exemplifies how citizen science can be used to enhance the capacity of communities, influence policies, and promote long-

term environmental sustainability. Through adaptation of approaches like this, successes can be achieved in other regions, where community members have a close relationship with the environment enhancing sustainable development and environmental conservation.

Community-based monitoring in the Arctic

A review of the capabilities, good practices, opportunities, and barriers of 30 community-based environment-monitoring programmes in the Arctic, with a focus on decision-making for resource management, is provided in the monograph *Community-Based Monitoring in the Arctic*, published by University of Alaska Press.



Section 2



Growing citizen science across Europe

How citizen science is requesting
its place in national science and
innovation systems

Romania: a successful launch of the first national citizen science platform



In Romania the citizen science landscape is still characterised by scattered groups of researchers and practitioners who are involved in first citizen science initiatives, but links between these people and to the international and European citizen science community are rare. This situation is starting to significantly change in Romania with the launch of the nation's first dedicated citizen science platform in May 2024, initiated by the Romanian ECS ambassador, Lucrina Ștefănescu, a researcher at the Babeș-Bolyai University. In this story we will introduce the first steps in forming a citizen science community in Romania, supported by the national funding agency Executive Agency for Higher Education, Research, Development and Innovation (UEFISCDI) and the establishment of strong links to the international citizen science community.



Figure 20. Online presence of the UEFISCDI representative at the launch event (credits: Babeș-Bolyai University, Rector's office, UBB patrimony)

Launching the citizen science platform and building a community in Romania

The creation and dissemination of Romania's first citizen science platform (<https://citizenscience.openscience.ubbcluj.ro>) represents a critical milestone in the country's scientific landscape. Led by Lucrina Ștefănescu and her team, the platform was developed over a year starting in April 2023 and serves as a central hub for citizen science activities, providing an essential resource for researchers and the public to engage with and expand citizen science projects.

"Once the idea of the platform was born, we went to every faculty of the university and presented it, along with the ECS platform and the European interest in citizen science," tells Lucrina about the first steps taken. And she adds: "Since I have been working in citizen science I have been trying to find other academic groups in Romania working in this area. I have found some separated and isolated projects and initiatives but no developed community on citizen science in Romania."

But this will change with the new platform that is also supported by the Executive Agency for Higher Education, Research, Development and Innovation (UEFISCDI), with project expert Alexandra Roman being present at the platform's big launch event, reflecting a growing institutional acknowledgment of citizen science's value.

Executive Agency for Higher Education, Research, Development and Innovation (UEFISCDI) is the main funding agency for research, development and innovation in Romania.

<https://uefiscdi.gov.ro/>



Figure 21. The launch event of the Romanian citizen science platform
(credits: Babeș-Bolyai University, Rector's office)

The new platform aims to unify the disparate citizen science efforts in Romania, creating a network that spans across universities and research institutions. The support from UEFISCDI is pivotal as it has the potential to connect to all Research Funding Organisations (RFOs) in Romania and promote the new national platform across universities and research organisations. This support is in line with UEFISCDI's efforts and mission, as well as with the objectives and the vision included in Romania's strategic document *White paper on transition to open sciences (2023-2030)*, drafted by the Ministry of Research, Innovation and Digitization and the Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI). This strategic document aligns the Romanian National Strategy on Research with the international Open Science policies and recommendations, among which is developing a national network dedicated to citizen science at the RDI community level in Romania.

Institutional and international engagement

The establishment of the citizen science platform has been accompanied by a significant expansion in international and institutional relationships. Lucrina's team at the Babeș-Bolyai University composed of both social and humanities experts and of natural scientists, initially unfamiliar with the global citizen science community, has rapidly integrated into international networks, becoming institutional members of both the European Citizen Science Association (ECSA) and the Association for Advancing Participatory Science (AAPS). This global integration has provided rich opportunities for mutual learning, broadening the local perspective on citizen science and introducing Romanian projects to a wider audience and fostering collaborative opportunities.

The **European Citizen Science Association (ECSA)** is a membership organisation set up in 2014 that aims to encourage the growth of citizen science in Europe and support the participation of the general public in research processes.

<https://www.ecsa.ngo/>

The **Association for Advancing for Participatory Science (AAPS)** is a member-driven organisation situated in the United States, that aims at sharing insights from across many related approaches and traditions, like citizen science, community science, and volunteer monitoring.

<https://participatorysciences.org>

Enhancing visibility and collaboration

One of the platform's key roles is to increase the visibility of various citizen science projects across Romania. Plans are underway to make the platform multilingual, offering content in Romanian, German, Hungarian, and Engli-

sh, which will extend its reach and impact. Moreover, discussions with the ECSA Working Group on the “European Citizen Science Platform” and the ECS development team aim to streamline the integration of Romanian citizen science activities into the eu-citizen.science platform, enhancing both visibility and collaborative potential.

The **ECSA Working Group on the “European Citizen Science Platform”** aims to be the central place of exchange for those interested in sustaining the EU-Citizen.Science platform, building it further and expanding it (e.g. adopting/making use of the platform source code, freely available, to set up a national/regional platform). By continuing to develop the European Citizen Science Platform we aim to contribute to the goal of establishing citizen science as a recognized, promoted and funded approach, one that fosters scientific literacy and the democratisation of science.

<https://www.ecsa.ngo/working-groups/european-citizen-science-platform/>

Institutional support and sustainability

The sustainability of the citizen science platform is supported by an emerging working group for Open Science at Babeş-Bolyai University, which aims to integrate citizen science as a key component of Open Science practices. This group has recently merged into an Office for Open Science, whose citizen science branch is led by Lucrina. The office is expected to secure ongoing funding and support for the platform, ensuring its long-term viability and effectiveness.

Impact on researchers and the public

The most immediate impact of Lucrina’s efforts as a ECS citizen science ambassador and the establishment of the new citizen science platform has

been on the researchers and faculty of her university, as well as others involved in citizen science in Romania. The continuous outreach and exchange on citizen science practices in Romania have not only introduced researchers to international citizen science initiatives but has also created opportunities for funding and collaboration, evidenced by the formation of the dedicated group of researchers engaged in or interested in citizen science. Furthermore, the platform's development has stimulated interest in citizen science among the general public, with initiatives aimed at involving citizens directly in scientific research and decision-making processes.

Future directions and challenges

Looking ahead, the main challenge remains integrating more stakeholders and securing the involvement of governmental bodies in citizen science activities. The strategy to engage UEFISCDI in opening the platform to all RFOs is a critical step towards achieving national-level integration of citizen science. Additionally, there are plans to host the first Romanian citizen science conference, which will further promote citizen science and foster a stronger community of practice. “To get more people on board we need more networking activities to get to know each other. And we need a bigger, institutional and strategic project that allows us to have financial and human resources”, explains Lucrina.

The launch of Romania's first citizen science platform marks a significant advancement in integrating science with societal needs. By fostering national and international collaborations, enhancing the visibility of citizen science projects, and supporting the development of a cohesive citizen science community, Romania is setting a strong foundation for the future of citizen science, with the potential to influence policy, research, and public engagement across the country and beyond.

Malta: consolidating the citizen science community

In Malta, citizen science has undergone a remarkable transformation, championed by individuals like Simone Cutajar and Arthur Lamoliere, whose dedication and innovative approaches have significantly advanced the field. Their recent projects have catalysed a consolidation of the citizen science community, influenced policy, and enhanced scientific research, establishing citizen science as a vital component of Malta's scientific landscape. This article is based on an interview with Simone Cutajar and Arthur Lamoliere, who talked to us about their citizen science endeavours.

Foundational activities and community growth

Simone Cutajar, a biologist, chemist, environmental activist, and ECS citizen science ambassador for Malta, has been instrumental in evolving citizen science on the island from its nascent stages to a more structured and impactful initiative. Over a decade ago, driven by environmental concerns, she launched grassroots data collection projects focusing on orchids, pollinators and bats. These projects have grown to involve more topic areas and a growing community of citizen scientists, to systematically engage and train volunteers to collect data in a standardised manner. Eventually, this led to significant national contributions in biodiversity data.

Arthur Lamoliere, an ecologist, has been a close collaborator of Simone's, providing both his expertise and immense enthusiasm. He initiated Malta's first Bioblitz on invasive species, further diversifying the types of citizen

science activities available on the island. Their partnership was rejuvenated with funding from the IMPETUS project, which allowed them to rebuild their citizen science community in a more structured manner, and also provided a springboard for Simone to take on the responsibility of ECS ambassador. Simone explains: "Arthur heard about this funding initiative, IMPETUS, which allowed us to start rebuilding and putting together a first networking event. And through the IMPETUS mentoring, we heard about the call for ECS citizen science ambassadors."

Arthur adds: "This event, where we tried to connect all the citizen science organisers in Malta was really a success. We got representatives of about 15 different citizen science campaigns together in a room, most of them pitched their projects to everyone. And we saw some common methodologies, some common approaches, and while some of them were in our fields, we also had other types of initiatives, seismology, marine biology, etc. And it was really impactful for me because I felt there is real potential for networking and collaboration."

IMPETUS is a project funded by the European Commission that gives recognition to citizen science by enabling a wider range of citizen science initiatives to access innovative funding. With this aim the project offers funding to kickstart new citizen science initiatives and to sustain existing ones.

<https://impetus4cs.eu>

A BioBlitz, or bioblitz, is an event that focuses on finding and recording all the living species within a designated area and thus an opportunity to take a snapshot of the biodiversity of a place. It is normally conducted by groups of scientists, naturalists, and volunteers, who learn techniques for observing and collecting plant and animal data within the specific area and time frame.



Figure 22. Participants ready for the BioBlitz in Malta (credits: Sarah Anne Abela)

After getting the ball rolling, both on their individual citizen science initiatives and the broader networking activities, Simone and Arthur are now looking to scale their efforts, connect the different existing Maltese citizen science communities, and engage more comprehensively with policy actors like the local environmental agency.

Institutional and policy engagement

The success of these initiatives caught the attention of Malta's Environmental Resources Authority (ERA). ERA expressed interest in expanding citizen science data collection beyond biodiversity to include other scientific disciplines, recognising the value of citizen science data in legal and environmental planning contexts, but also to fulfil reporting duties on a national and European level that



Figure 23. Vanessa cardui observed during the BioBlitz in Malta (credits: Sarah Anne Abela)

could not otherwise be met. It even showed willingness to financially support these efforts on a broader scale.

As Simone puts it: “I’m helping ERA set up a long-term national citizen science pollinator campaign (MPOMS - Malta Pollinators Monitoring Scheme), collecting data on butterflies, bees and hoverflies, as paid work. And aside from these little funds, ERA is interested in data from our other citizen science initiatives, such as the orchids campaign, to the point that they want to negotiate buying it. We have agreed that they will fund the campaign to keep it going and in return, we licence them access to the data.”

Arthur expands on that: “Citizen science is really good for the environmental authorities in Malta because that’s really underfunded here. And we literally had ERA telling us ‘You guys are doing a better job collecting data by running a citizen science campaign than us hiring professional ecologists’, because we diversify the sampling, we just produce much better quality data for a fraction of the price. We really have the chance to make a difference here.”



Figure 24. Participants analysing specimens after the BioBlitz in Malta (credits: Sarah Anne Abela)

ERA's engagement has also manifested in plans to develop a comprehensive citizen science data collection strategy across all Maltese islands — a move that underscores the growing institutional recognition of the utility of citizen science. The close collaboration with ERA and the alignment on conservation efforts between the agency and the citizen science practitioners also showed benefits beyond the collection of data, leveraging the existing relationships and direct communication channels to contribute to larger conservation goals.

"In years past, we had situations where there was illegal development happening in areas where volunteers were collecting data on orchids and bats. Volunteers saw these development projects in the field and informed our citizen science organisation, which in turn contacted ERA, who went to check what was happening. And they saw that there was illegal development and had it stopped," says Simone.

Community building and educational Impact

A key component of Simone and Arthur's approach is their focus on community building and education. Their pollinator and orchid data campaigns, which involved training citizens to identify various species, not only facilitated scientific data collection but also allowed participants to gain new knowledge and skills, and fostered a sense of community among citizen scientists from highly diverse backgrounds. This initiative has been particularly successful, evidenced by the return of participants year after year, who are now knowledgeable enough to train newcomers, thereby sustaining the project's momentum and impact. Their highly diverse community is nurtured mainly via word of mouth, with communication facilitated through messenger apps. Of special note are the young science students who can be part of a real research project and gain experience while Simone and Arthur made sure they could also earn qualification credits for colleges and universities and contri-

bute to scientific publications. A participating scout leader also took the initiative on collaborating with the scouts and designing a new "orchid heroine" badge and thus engaging young people in a more systematic way. This will be up and running with the next orchid season coming up in October/November 2024. Such examples demonstrate how much ownership community members feel over these citizen science initiatives. Simone recounts:

"I absolutely, utterly enjoy mornings with citizen scientists where we spend 3 hours together identifying pollinators where you see real community building happen. Even after a break, the same faces return and they're so happy to see each other again, and now they're coming with experience and they can lead a group of new citizen scientists. And you get such huge diversity, older people coming on their own, families, young children coming with their friends, students. People who just moved to Malta and want to be involved in stuff. And they're just so keen, so interested. Now, unfortunately, we needed to start limiting the numbers and you get people messaging like 'Oh no, I should have booked before.' So they pre-booked for next month. Or if someone cannot make it, they message ahead to inform you."

The team also makes quality control an integral part of their efforts, having all data validated by involved experts, collecting their feedback to make sure that the science is being done well, and collecting feedback from citizen scientists after every session to adjust the process according to the lessons learned during each implementation cycle.

Challenges and institutional barriers

Despite these successes, Simone and Arthur have encountered significant challenges, particularly in the form of institutional barriers within the university setting that hindered administrative and financial processes. Arthur also points out problems he sees as somewhat specific to Malta: "Collabo-

ration is not that easy around here. People are really individual, especially when it comes to research.” This fact makes the progress towards more interconnected citizen science networks especially important – and encouraging. Arthur also identifies a clear hierarchy of needs in achieving scientific impact: “We can have a good impact on science. But unfortunately, we have to make a political impact before we can have a scientific impact. So it's really important to prioritise communication. This is also what happened at ERA, the politics had to be involved to get funding to then make scientific progress.”

Funding is an overall difficult topic, and tensions between the academic (funding) system and the concrete goals sought by the citizen science initiatives helmed by Simone and Arthur leave them with some precarity for the future. Any potential Maltese citizen science network would for instance have to find an institutional home while still maintaining its independence. These challenges underscore the need for better support systems for citizen science within academic and governmental structures. However, the proactive approach by ERA, including direct contracting and support for citizen science initiatives, signifies a potential shift towards more institutional backing for citizen science activities.

Strategic impact and future directions

Looking towards the future, the impact of citizen science in Malta is poised to expand significantly. Plans for annual networking meetings and national citizen science activities, hosted in turns by relevant institutions such as ERA, the University of Malta, other educational institutions, and NGOs, will enhance visibility and integration of citizen science across different scientific disciplines and policy areas. The enthusiastic involvement of communities and NGOs, coupled with increasing political and institutional support, suggests a potentially bright future for citizen science in Malta.

The evolution of citizen science in Malta, driven by passionate individuals like Simone Cutajar and Arthur Lamoliere, exemplifies how dedicated efforts can transform an initially modest initiative into a powerful tool for science and society. With ongoing community engagement, institutional support, and policy integration, citizen science in Malta is set to become an indispensable part of the national scientific infrastructure, impacting a wide array of stakeholders from local communities to national policy-makers.

We leave the final word to Simone, who already has a clear vision for the next steps: “For the national citizen science strategy, we’re starting off with biodiversity and then move on to a bigger discipline. ERA wants me to lead it. They said Sim, we'll leave it up to you to bring in whoever you think should be brought in to make sure everyone is represented at the table. Of course, once that happens, we will bring in different representatives of citizen science that's happening in Malta but also citizen science that might not yet be happening in Malta but could start happening. So it would be an opportunity to kind of open up different fields of citizen science. Currently, we don't really see things like medical citizen science over here yet for example.”

Ireland: a shift towards an integrated vision for citizen science



The combined efforts of the Trinity College Dublin (affiliated partner of the ECS project) and the ECS citizen science ambassador for Ireland resulted in a first network meeting of researchers and practitioners involved in citizen science. Concerted efforts towards policy-makers and funders enable a growing recognition of the value of integrating public participation in scientific research and decision-making processes, poised to shape the future of science and society in Ireland and beyond.

In the dynamic landscape of citizen science in Ireland, recent developments have marked a significant shift towards a more integrated and policy-focused approach to science and public engagement. In this impact story we summarise the insights of Joseph Roche and Aoife Taylor from the Science and Society Research Group of Trinity College Dublin, an affiliated partner in the ECS project, who has already started to promote citizen science in the research community of Ireland during the EU-Citizen.Science project ended in 2021.

Joseph explains how this consistency leads to tangible benefits: "One of the people designing the strategy for the new national research funding agency for Ireland reached out to me and said: 'We are thinking about incorporating citizen science into our funding strategy, would you be willing to speak to us?' And that is another example of the soft power that comes from the ECS and EU-Citizen.Science project projects. I'm sure those government of-

ficials did their homework and looked at what's happening in Europe and then found my name."

The ECS citizen science ambassador initiative: catalysing change

Another important factor positively impacting the advancement of citizen science in Ireland are the synergies of Joseph's work with the ECS citizen science ambassador programme. Since Joseph is a professor and as such an academic voice in the community, the collaboration with Irish ECS ambassador Oscar Diaz, who operates from the Creative Spark Enterprise Fab Lab in Dundalk, has been key in creating bridges between more academic research and practical, community-based science. Their cooperation allows them to maximise the impact of both hands-on, community-driven projects and strategic networking events.



Figure 25. Welcoming attendees to the first event around establishing a citizen science network in Ireland (credits: OscarDiaz)

Creative Spark Enterprise Fab Lab provides professionals, SMEs, innovators and makers in the North East region of Ireland with access to equipment, support and training in digital design and advanced fabrication. It is a dynamic centre for digital design and fabrication, knowledge-sharing and innovation.

<https://creativespark.ie/fablab.html>

Joseph sees Oscar's proactive approach and connection with grassroots movements as instrumental in galvanising the citizen science scene and, in the end, establishing a formal citizen science network in Ireland, promising

a structured platform for citizen science activities across the country: “I have a public role and that can be very valuable sometimes, but I think for a fledgling citizen science network like we're building towards in Ireland it's better to have someone more independent and Oscar just really fulfils that role. So we're trying to support him through the ECS project, we're organising events, we're booking the venues and catering, we have an extensive mailing list, all that kind of stuff. But it's Oscar who is going to be the voice. And in the upcoming event we'll have some workshops for people to get involved in citizen science activities, but also a session on citizen science policy in Ireland and that's going to be led by my colleague Aoife Taylor and myself.”



Figure 26. Setup for the Soil Your Scarf workshop at the CitSci Event (credits: OscarDiaz)

Networking and policy engagement

A key event in the Irish citizen science calendar this year was the inaugural citizen science networking event on 4th of July, hosted in "Unit 18", a community space located on the East campus of Trinity College Dublin. This event, aptly titled Establishing a citizen science network in Ireland, gathered stakeholders from various sectors to discuss the current state and fu-

ture of citizen science in Ireland. The networking event focused on building connections between researchers and practitioners of citizen science while also delving into policy discussions, reflecting a strategic shift in discussions towards the influence of data generated by citizen science initiatives on policy-making. The discussions were also set to bridge grassroots initiatives and top-down policy approaches, highlighting projects like Soil Your Scarf, which engages citizens in environmental monitoring through innovative means inspired by preceding Soil Your Undies citizen science campaigns.

Soil Your Scarf (based on the popular citizen science soil health project "Soil Your Undies") is an initiative led by Jessica Leonard and supported by Fibreshed Ireland, a non-profit organisation that is focused towards fostering ecosystem and community health through the development of regional fibre systems.

<https://fibreshed.org/affiliate/fibreshed-ireland/>

The final workshop is on citizen science and policy in Ireland, so we'll talk a bit about our experience of trying to get politicians in Ireland to listen to our thoughts and citizen science, to try and make citizen science more of an item on the political agenda," adds Joseph. "We are lucky enough to have a platform and a privilege in terms of people listening to us, including government ministers. We'll see how we can affect policy and act as agents of this citizen science network in Ireland."

As mentioned in the beginning, continuous engagement with policy-makers and funding agencies on citizen science has been key in capitalising on opportunities for its advancement in Ireland. Joseph outlines ongoing high-level structural changes in the Irish science

Figure 27. Attendees took part in workshops like 'Soil you Scarf', led by Jessica Leonard and supported by FibreShed Ireland (credits: OscarDiaz)



system in the forthcoming integration of the Science Foundation Ireland (SFI) and the Irish Research Council (IRC) into a new entity, called Taighde Éireann (Research Ireland). This integration offers a fresh opportunity to embed citizen science into a national funding strategy, facilitated by the continuous work done by Joseph and the citizen science community and supported by the efforts of broader, EU-funded projects. Another example comes from Joseph's work with County Councils, which govern Ireland's counties. His efforts on local engagement pushes to amplify the impact of citizen science while ensuring that it is recognised as a valuable element in regional and national development plans.

"While it's sometimes difficult to connect with policy-makers, one area where we had some success is with County Councils. We shared some of our work from the ECS project and the eu-citizen.science platform with some of the Councils, and Kildare County Council actually contacted us and asked us to come present on citizen science. And they followed up with me, they asked me for resources, and they then committed to trying to have citizen science as something that they fold into their next strategy." Joseph explains.

Figure 28. Attendees had the chance to know their own scarfs as part of the 'Soil Your Scarf' initiative (credits: Alison Zobenko)

Broader impacts and future prospects

Beyond the impacts of these activities already outlined, the wider citizen science community stands to gain from the increased visibility and legitimacy that these efforts confer. Direct beneficiaries include networking partners, project participants and policy-makers engaged in these discussions, yet we already see first indications of these stakeholders' willingness to leverage their positions into a broad establishment of citizen science in Ireland. Looking ahead, the integration of citizen science into academic curricula and funding strategies promises to sustain and expand its influence and visibility in Ireland, empowering a new generation of researchers and citizen scientists. The evolving narrative of citizen science in Ireland also highlights a growing recognition of the value of integrating public participation in scientific research and decision-making processes, poised to shape the future of science and society in Ireland and beyond.



Italy: a success story of pioneering citizen science

The Italian citizen science community has triggered concerted efforts to develop the field in Italy and demonstrates a successful model of multi-stakeholder engagement, collaboration, and impact generation. The establishment of the National Citizen Science Association, strategic initiatives under the National Recovery and Resilience Plan, and influential roles in global platforms are collectively driving Italy towards a robust and sustainable citizen science future.

Italy has made remarkable strides in establishing the field of citizen science, setting an inspiring example for other countries. This story highlights the efforts of various stakeholders, particularly Andrea Sforzi, Director of the Maremma Natural History Museum and representative of the ECS partner organisation Fondazione Grosseto Cultura, together with the members of the CSI steering committee. With a background in wildlife biology, Andrea's work with the Museum was instrumental to this achievement through its contribution to the set up of the National Citizen Science Association, the National Recovery and Resilience Plan, and its active participation in global initiatives like the G7 Science Communication Working Group. Andrea has been an active promoter of citizen science in his country and amongst the European citizen science community from the onset — being one of the founders of the European Citizen Science Association (ECSA). Already during the runtime of the ECS predecessor project, EU-Citizen.Science project, he was key in reaching out to other researchers in Italy to promote citizen science and liaise with those who engaged in first citizen science ini-

tiatives. This work continued very actively during the ECS project, with a strong focus on the relationship to political decision-makers.

Maremma Natural History Museum is located in Grosseto and mainly **dedicated to the environment of southern Tuscany**. The museum is a cultural centre and a place for dialogue between the scientific community and the public, through e.g. guided tours, educational activities, special projects, and exhibitions.

<https://www.museonaturalemaremma.it/>

Fondazione Grosseto Cultura is a non-profit organisation aimed at protecting and promoting cultural activities of the performing arts, higher education and scientific research. It was established by the Grosseto Municipality to manage the Maremma Natural History Museum, the Istituto Musicale Comunale Palmiero Giannetti and the House of Arts Polo Culturale Le Clarisse, in Grosseto.

<https://www.fondazionegrossetocultura.it/>

Establishing the National Citizen Science Association

In 2023 the Maremma Natural History Museum was amongst the main drivers in founding the National Italian Citizen Science Association, which has been key in promoting citizen science across Italy. The association's first national conference in November 2023 was a resounding success, attracting more participants than the venue could accommodate.

Figure 29. Group picture at the Citizen Science Italia national conference 2023 (credits: Alessandro Oggioni)



The **Italian Association of Citizen Science** was founded in February 2023 with headquarters at the Natural History Museum of Maremma in Grosseto. It has the goal of fully developing Citizen Science in Italy and building inclusive and collaborative tools and solutions in close contact with the other international networks.

<https://www.citizenscience.it/>

Figure 30. The marketplace at the Citizen Science Italia national conference 2023. An ideal occasion for discussion and networking (credits: Alessandro Oggioni)



“The idea was to showcase different Italian projects and to set up the conference not only as a place to showcase our own projects, but to have some slots to discuss general questions, like the relevance of citizen science data and the role of citizen science in European funded projects”, states Andrea.

One of the significant outcomes of the conference was the engagement of the Ministry of University and Research (MUR). A delegate from the ministry attended the conference, indicating a positive, albeit initial, interest in collaborating with the association. The long-term vision includes establishing a National Citizen Science Centre, akin to Austria's model, with formal ministerial support. This centre would serve as a hub for coordinating citizen science efforts, enhancing Italy's capacity to contribute to the ECSA and its goals.

The November conference also saw the formation of two working groups: one focused on creating a network of researchers and teachers interested

in developing citizen science activities in schools and another dedicated to young citizen scientists (intended both as early career researchers and young volunteers actively taking part in citizen science projects). With 120 members and an expert on science communication employed, the association is gearing up for its next conference in April 2025 in Bologna, aiming to include international participants through English-language workshops.



Figure 31. The marketplace at the Citizen Science Italia national conference 2023 (credits: Alessandro Oggioni)

Advancing through the National Recovery and Resilience Plan

Another important cornerstone driving citizen science in Italy is Italy's National Recovery and Resilience Plan, funded by the European Commission. It has allocated substantial resources to reinforce biodiversity research. This initiative led to the creation of the National Biodiversity Future Center (NBFC), comprising 38 institutions working over three years. A key component of this centre is citizen science, which is envisioned to continue beyond the project's lifespan of three years. The centre's scientific coordinator recognises the potential of involving hundreds of citizens in research, thereby strengthening the influence of scientific findings on political decision-makers.



Figure 32. The policy session dedicated to the proposal of a National Center for citizen science in Italy at the Citizen Science Italia national conference 2023 (credits: Alessandro Oggioni)

A citizen science working table was launched at the First National Forum dedicated to Biodiversity in Palermo in May 2024, coordinated by Andrea, to develop concrete activities supporting citizen science within the next 18 months.

"The Center is divided into eight different spokes," explains Andrea, "The table on citizen science spans over all of them and has one year and a half ahead trying to create something concrete on citizen science in the framework of National Biodiversity Future Center. Among the proposed activities are the coordination of researchers already engaged in citizen science and the development of training and networking opportunities for those interested in the topic, but with little or any experience of citizen science".

Most remarkably, this includes also creating a national platform for citizen science projects, to be built up through the open source software of eu-citizen.science, and supporting citizen science initiatives by cascading grants ranging from 10,000 to 30,000 Euros for institutions outside the National Biodiversity Future Center.

Advancing global policy on citizen science

Andrea's appointment to the Science Communication G7 Working Group marks another significant milestone for Italy in the global citizen science arena. By advocating for citizen science in formal documents, Andrea is trying to position it as a central theme for future scientific endeavours at the G7 level. This high-level policy engagement offers Italy a unique opportunity to contribute to international discussions and foster greater integration of citizen science in global scientific and policy frameworks.

Contributing to sustainable change

The impact of these initiatives spans multiple levels: individual citizens can contribute to and make their voices heard through an ever-growing multitude of citizen science initiatives in Italy. Through the establishment of more sustainable citizen science infrastructures, small associations to universities and research institutions are able to collaborate with citizens and communities to address complex scientific and societal issues. The inclusive approach ensures that anyone interested in citizen science in Italy can benefit from the resources and support provided.

"I was not aware how important the policy work was, some years ago. But now I want to create something useful that will stay. We have to create the need and have people see the relevance of it." says Andrea.

The primary driver of these achievements is the growing awareness within science, society, and among policy-makers of the importance of public engagement in scientific research. However, the increasing popularity of citizen science also brings challenges. There is a risk of the term being misused or misunderstood, leading to confusion about its true essence. To address this, clear guidelines and information is needed, ensuring that citizen science is practised authentically and effectively.

Italy's concerted efforts in citizen science demonstrate a successful model of multi-stakeholder engagement, collaboration, and impact generation. The establishment of the National Citizen Science Association, strategic initiatives under the National Recovery and Resilience Plan, and influential roles in global platforms are collectively driving Italy towards a robust and sustainable citizen science future.

The Netherlands: catalysing citizen science nation-wide



The recent developments surrounding citizen science in the Netherlands represent a meaningful step forward in integrating science with societal needs and policy frameworks. The continued growth of the national citizen science network, supported by significant national funding, and policy engagement at various levels, positions the Netherlands as a strong partner in the global citizen science community. As these efforts continue to evolve, the potential for impactful change and enhanced public engagement with science looks promising, setting a benchmark for other nations in the realm of citizen science.

In recent years, the Netherlands has become home to a plethora of citizen science activities, ranging from grassroots initiatives to high-level policy engagement. These efforts have been shaped by collaborations and funding achievements, showcasing a dynamic shift towards a more inclusive and policy-integrated approach to science. The following impact story summarises insights gleaned from the activities of Leiden University's Citizen Science Lab. For this piece, we spoke to Lab Coordinator Margaret Gold and Researcher and Community Manager Anouk Spelt.

Leiden University's Citizen Science Lab was founded in 2018 by three researchers to consolidate and build on knowledge gained in participatory research practices across all faculties of the University.

It serves as a central knowledge and research hub and brings together scientists, citizens and community stakeholders in new collaborations to tackle urgent societal issues in citizen science investigations, Citizen Observatories, and Living Labs.

<https://www.universiteitleiden.nl/en/citizensciencelab>

From grassroots initiatives to policy engagement

The Citizen Science Lab has a broad portfolio of citizen science projects. One growing grassroots initiative revolves around measuring air quality in locations across the Netherlands. With the long-term goal of improving air quality, the project enhances people's awareness and understanding of air quality issues by making particulate matter measurements visible in a photo, utilising a light-painting technique.

Luchtkwaliteit in Beeld (Air Quality in the Picture) deploys a novel "light painting" technique to photograph particulate matter measurements taken by an Air Quality sensor by instructing an LED strip to flash at a higher volume and frequency according to the measurement, and capturing this in the photograph via a long open shutter speed. Originally conceived by artist Robin Price in partnership with environmental scientists at Birmingham University, it aims to make the invisible visible in the 'Air of the Anthropocene' project. The Citizen Science Lab implementation places the kits and instructions to build your own 'Pollution Painter' in the hands of local residents such that they become the photographer and storyteller, as well as the citizen scientist.

<https://luchtkwaliteitinbeeld.nl/>

By going on photo expeditions in locations around the city where sources of air pollution may coincide with groups at higher risk of exposure or health impacts (such as day care centres on a busy road) and visualising real-time particulate matter measurements at that location in the photo in juxtaposition with the background, participants are leveraging the storytelling power of the photos for discussions about sources of pollution and potential individual and community-led actions. The photos are also a powerful aid in setting the policy agenda and campaigning for local interventions to improve local air quality in line with the European Clean Air Directive.

Although this project was launched and continues to be facilitated by the Citizen Science Lab, participants have taken ownership of the project and are collectively keeping it alive despite receiving only intermittent funding. The open source / open hardware approach embedded in the project to invite creative innovation and new applications of the technique are already opening up new pathways in the project thanks to the invention of a 'Digital Pollution Painter' variant by one of the participants, which enables day-time photo taking and thus a wider range of storytelling abilities. Another participant chose to spend their under-graduate programme student project within the Citizen Science Lab, enabling Luchtkwaliteit in Beeld to have a high-visibility presence at a city-wide public event that attracted new participants.

The initiative is supported in its next phase by the EU-funded CitiObs project, as an example of citizen-led action and the impact of citizen involvement in environmental monitoring and advocacy.



Figure 33. Two participants in the Luchtkwaliteit in Beeld project setting up for a Light Painting photo in front of the Leiden University Medical Centre (LUMC) (credits: Alessandro Oggioni)



Figure 34. Before photo taken using the 'Luchtkwaliteit in Beeld' technique outside the entrance of the LUMC (credits: Marvin Tjon)

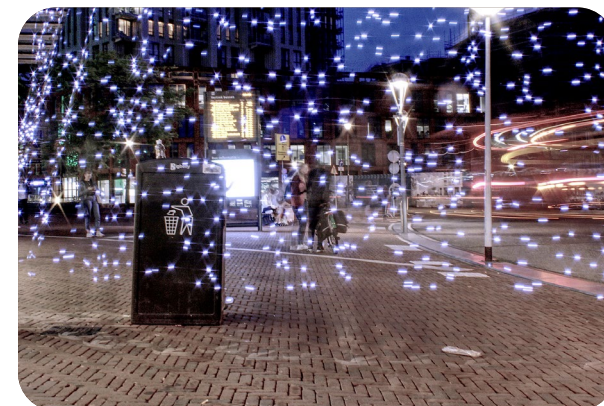


Figure 35. After photo taken using the Luchtkwaliteit in Beeld technique at the moment a smoker is standing outside the entrance of the LUMC, which visualises the resulting air pollution (credits: Marvin Tjon)

Alongside such grassroots efforts, and the work to embed Citizen Science practices within the Open Science Programme of Leiden University, the Citizen Science Lab has also engaged in high-level policy activities that aim to strengthen support for citizen science at all levels. By working closely with entities such as the National Programme Open Science (NPOS), which is now embedded in the Open Science NL programme of the Dutch Research Council, and the Global Science Forum Citizen Science Working Group of the Organisation for Economic Co-operation and Development (OECD), the Citizen Science Lab has been actively shaping policy recommendations and actionable input for global and national policy-makers. Of particular note here are also efforts initiated together with the Policy Working Group of the European Citizen Science Association (ECSA) to secure dedicated funding for citizen science in the upcoming Framework Programme 10 (FP10) of the European Commission.

The **ECSA Working Group on “Policy, strategy, governance and partnerships”** has been initiated in 2024 with the aim of informing on and advocating for the value of Citizen Science for achieving policy goals such as understanding and enriching the environment, dealing with the effects of climate change, enhancing the public’s relationships with research and with the natural world. It seeks to promote the benefits and impacts of Citizen Science to policy-makers and those who influence them, to collect case studies and research evidence about policy outcomes of Citizen Science activities, as well as to represent policy-related goals and achievements to ECSA’s members and governance structures. <https://www.ecsa.ngo/working-groups/policy-strategy-governance-and-partnerships/>

By approaching citizen science in a holistic manner, supporting a broad spectrum of activities from local community engagement to the integration of citizen science into broader policy frameworks, the Citizen Science Lab

is working to enhance the reach and effectiveness of citizen science in the Netherlands and beyond.

National Citizen Science Network

Another major advancement in the citizen science landscape of the Netherlands has been the launch of the Citizen Science Netherlands Network (CS-NL), which is currently being co-lead by the Citizen Science Lab and two members of the DesignLab at the University of Twente. The DesignLab facilitates creative collaboration and knowledge transfer between researchers, societal organisations, students, and citizens (<https://www.utwente.nl/en/designlab/>).

The **Citizen Science Netherlands Network (CS-NL)** is a vibrant and active community of Citizen Science practitioners, initiators, researchers and participants who come together to share knowledge and know-how for participatory research and societal engagement practices that partner with and for the benefit of society. <https://www.cs-nl.network/>

Citizen Science Netherlands Network was co-created with various stakeholders and currently hosts both general networking events and thematic working groups, while also sharing information through a monthly newsletter and via social media, with the primary goal of enabling individuals with similar interests to connect and collaborate. Since May 2024, funding has been secured to expand and professionalise this network, and offer tangible support to the growing community of more than 500 members who represent practitioners both inside and outside of academia.

“Over the last couple of years, it’s just been growing and growing and people coming together during different events and organising meetups. As

an example, there were already people who didn't know that they were working on the same topic but they met at a networking day and now they know about each other's projects. It already has so much impact that people are finding other people to exchange ideas, good practices and collaborate on new projects", says Anouk Spelt, researcher at the Citizen Science Lab and Community Manager of the Citizen Science Netherlands Network.

Policy impacts and funding innovations

All of these activities also tie into and enhance national policy-making efforts. Most prominently, this includes collaboration with relevant decision-makers towards the development of additional and dedicated funding instruments for citizen science research in the Netherlands. Other efforts focus on broadening the eligibility criteria for research funding and exploring alternative funding sources, such as social innovation grants and municipal support: "We have to look at other types of funding bodies and other types of funding. All of the long, ongoing projects are NGO-supported, and I think we are not partnering enough there. Cities, municipalities, environmental agencies, etc., those are the types of funding bodies we need to be reaching," explains Margaret Gold, manager of the Citizen Science Lab.

Furthermore, Margaret acknowledges an opportunity in exploring cultural funding models, which could provide more flexible and adaptable financial support for citizen science activities at the grassroots level. Such models remove many of the current funding application barriers, and acknowledge the dynamic nature of community-led citizen science projects, allowing for more flexible adjustments and evolutions in project goals and methodologies.

Stakeholder impact and future directions

Margaret and Anouk witnessed the most direct impact of their initiatives on the participants and network partners, who have experienced enhanced agency and collaboration opportunities. Similarly, connecting different stakeholders with and on the policy level — nationally and internationally — on the matter of citizen science has been an essential dimension of the work undertaken by the practitioners of the Citizen Science Lab.

As Margaret puts it: "Probably the single most important thing I've done in the entire piece of work is just connecting ministry representatives with their own national communities of practice. In several cases, they've been unaware of their own local richly active community, and the many examples of existing projects. Improving this visibility requires a stronger connection between the field of practice and the national policy level."



Figure 36. Members of the Citizen Science Netherlands Network at the first Dutch national Citizen Science Network Day on November 11, 2022 (credits: Citizen Science Nederland Network)

National networks such as Citizen Science Netherlands Network are crucial for facilitating the exchange of experiences and good practices, and for showcasing how citizen science can be done effectively. But these examples

also highlight an important challenge, in that key stakeholders often don't know each

other, don't talk to each other, or are not even mobilised to begin with. While the

Citizen Science Lab thus serves as an

important mediating institution, it also seeks the

establishment of thematic

working groups within mini-

stries, funding agencies, and

other key institu-

tions to support a more streamlined capaci-

ty building process leading to longer-term expertise — and the

establishment of communication chan-

nels between the two such that citizen science practitioners can connect to the right people more easily, and evidence from practice becomes more visible at the policy level.



Figure 37. Members of the Citizen Science Netherlands Network in discussion about potential Working Groups at the Citizen Science Network Day on November 11, 2022 (credits: Citizen Science Nederland Network)

Overall, the developments outlined in this piece represent a significant step forward in integrating science with societal needs and policy frameworks in the Netherlands and beyond. The continued growth of the national citizen science network, combined with innovative funding strategies and robust policy engagement, positions the Netherlands as a champion of citizen science even on an international scale. As these efforts continue to evolve, the potential for impactful change and enhanced public engagement with science looks promising, setting a benchmark for other nations in the realm of citizen science.

Something to keep in mind in all of this is the plurality of participatory research practices that exists, as stated in the vision document for citizen science in the Netherlands (available on [Zenodo: https://zenodo.org/records/11380411](https://zenodo.org/records/11380411)):

There are many ways of describing and naming participatory research practices, varying according to the question being researched, the nature of the task or collaboration, and the objectives and motivations of those participating. This can be seen for example in the range of terms that the members of the Citizen Science Netherlands Network use to describe their approaches. We embrace and seek to protect this plurality and diversity of practices in the Netherlands, and aim for balanced representation within the network of initiators and practitioners from all walks of life.

Further explorations: the European citizen science platform



This book tells 12 stories that can inspire new experiences and initiatives. But the vast ocean of citizen science is full of unexplored islands and routes that everyone can help make known. That's why the **European citizen science platform** exists.

Born from the EU-Citizen.Science project in 2020, the **European citizen science platform** (eu-citizen.science) has now become a frequently used and well-populated platform for the broader citizen science community in Europe. The platform has further thrived within the ECS (European Citizen Science) project that started in August 2022.

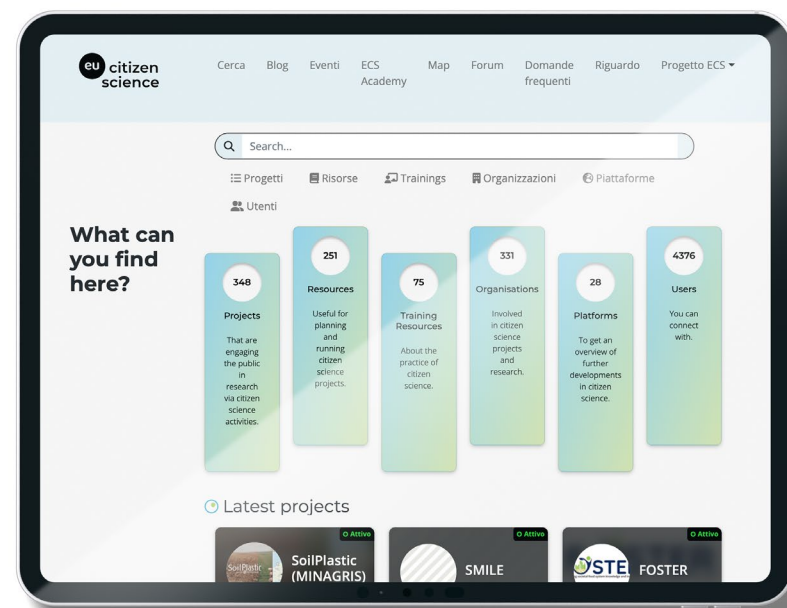
Within ECS, the platform continues to represent the main place to share project profiles, resources, training, ideas, events and more, to connect with and strengthen the community. It is also further evolving as the online counterpart of the association itself. The European Citizen Science Platform has been built by the community and for the community. The platform is open to everybody and parts of it are available in 12 languages.

At the time of the publication of this book (September 2024), the platform gathered more than 240 resources on citizen science and over 75 training resources. The latter are designed to be used for teaching or training on the practice of citizen science. These are self-directed and can be taken any-

time. You can find over 340 profiles of projects that are engaging the public in research via citizen science activities, more than 320 organisations, 29 other platforms and almost 7000 fellow citizen scientists, who may be your exploration companions.

The platform also features a blog collecting stories, interviews and good readings, a forum, the possibility to discover people and organisations to connect with, and a calendar with events on citizen science.

The European citizen science platform: <https://eu-citizen.science/>



The European citizen science platform



Your gateway to training, resources, projects and community



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Meet the authors



Teresa Schaefer

Teresa Schaefer studied Economics at the University of Vienna. Her research work at the Centre for Social Innovation (ZSI) focuses on participation processes in digital social innovations and the assessment of their impact. Teresa was co-author of the *Citizen Science White Paper for Europe*, she contributed to the elaboration of an impact assessment framework for citizen science and has led the work on evaluation and impact assessment in numerous citizen science projects. She has many years of experience in participatory methods for design and evaluation, involving a broad range of citizens in research projects.

Barbara Kieslinger

Dr. Barbara Kieslinger is a senior scientist at the Centre for Social Innovation (ZSI) in Vienna, Austria. She has been engaged in and studying citizen science for many years, working on evaluation and impact assessment and contributing to the first whitepaper on citizen science in Europe. Her research is concerned with citizen science and citizen innovation, open science, and the relation between technological/digital and social innovations. Barbara is a guest editor of the *Citizen Science in Theory and Practice journal*.

Stefanie Schuerz

Stefanie Schuerz studied sociology and science and technology studies at the University of Vienna and works as a researcher and project manager at

the Centre for Social Innovation (ZSI). Her primary focus is on evaluation and impact assessment, multi-stakeholder engagement and citizen science, as well as research ethics and integrity. Stefanie has coordinated processes for the co-design of R&I policy recommendations and has collaborated with funding agencies in the development and evaluation of participatory activities. In addition to her work at ZSI, Stefanie also acts as a mentor to citizen science initiatives.



Teresa Schäfer

Barbara Kieslinger

Stefanie Schuerz

Figure 38. Teresa Schäfer, Barbara Kieslinger, Stefanie Schuerz at the ECSA2024 conference in Vienna (credits: ÖCSK 2024 / Ouriel Morgensztern)

Centre for Social Innovation (ZSI)



The Centre for Social Innovation (ZSI) is a private non-profit institute for applied social sciences and a Centre of Excellence for social innovation based in Vienna, Austria. It implements research and application projects on the social embedding and impact of all types of innovations and contributes to the design and diffusion of socially accepted and sustainable innovations to meet global challenges.

In this book, we tell 12 impact stories from citizen science efforts implemented across Europe. They serve as examples of how citizen science can create change with and for our society with the aim of achieving a more inclusive and sustainable future.



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