

**Developing a citizen science initiative to support community land-based activities**

Summary of progress

**Aberdeen city © Tareq Mzek (2024)**

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# Context

The Scottish Government Rural and Environment Science and Analytical Services (RESAS) division funds the [Strategic Research Programme 2022 to 2027](https://www.gov.scot/publications/environment-agriculture-and-food-strategic-research-2022-27-overview/pages/strategic-research-programme-2022-to-2027/) to advance the evidence base in the development of rural affairs, food and environment policies.  One of the themes (Theme E) of the Strategic Research Programme 2022 to 2027 is on **Rural Futures**. This theme has three research topics: rural communities, rural economy, and land reform. There are two projects within each topic, led by the James Hutton Institute (JHI) and Scotland’s Rural College (SRUC). This publication is one of a series of publications from this theme.

 Within the land reform topic, the two projects are:

1. [Scotland’s Land Reform Futures](https://www.hutton.ac.uk/research/projects/scotlands-land-reform-futures)
2. Impacts of Land-Based Financial Support Mechanisms on Land Values, Landownership Diversification and Land Use Outcomes

The current research is part of the first project, and it aims to provide a better understanding of:

* If and how a collaborative citizen science approach may be useful for supporting community land-based activities.
* How developing capacity to generate/use land data by rural communities of place can support community land-based activities.

Previous publications from the Scotland’s Land Reform Futures project are:

* [Understanding community access to land data](https://www.hutton.ac.uk/sites/default/files/files/Hutton%20-%20Community%20land%20data%20report%20-%20A_McKee%20%26%20A_%20Marshall%20revised%202_6_23.pdf)
* [Alternative Land Tenure Models: International Case Studies and Lessons for](https://www.hutton.ac.uk/sites/default/files/files/Alternative%20Land%20Tenure%20Models%20-%20Naomi%20Beingessner%2C%20Hutton%2C%20June%202023.pdf) Scotland
* [Understanding public values of land: A developing typology](https://zenodo.org/records/10689007)
* [Review of Land Ownership Data in Scotland](https://zenodo.org/records/10727568)

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The authors gratefully acknowledge the time and expertise provided by members of the Stakeholder Advisory Group of the Scotland’s Land Reform Futures project.

# Highlights

**What were we trying to find out?**

We explored how we could design a ‘citizen science’ approach that builds community capacity to use land data in support of planning and implementing community land-based activities.

**What did we do?**

We conducted a scoping review of literature on citizen science and its applications in relation to land, to identify potential opportunities and best practices for using citizen science in this context. We prepared a proposal for a citizen science initiative that could support the use of land data by communities in the development of community land-based activities. We shared this with the Stakeholder Advisory Group for the Scotland’s Land Reform Futures Project and sought their feedback. We consulted Planning Aid Scotland (PAS) and Development Trusts Association Scotland (DTAS) for advice, and for suggestions about place-based rural communities for whom this initiative may be useful.

**What did we learn?**

The proposed citizen science approach may be of use to rural communities of place who are engaging in community planning and development processes. Support for collecting and using land data may be particularly helpful in providing evidence to bolster Local Place Plans, Community Action Plans, and building cases for community land acquisitions.

We learned it is important to develop a conscientious collaboration with communities and to strive for reciprocal benefits from this citizen science research project. This could involve shaping the research topic, questions, methods and analysis around community needs and aspirations for land, considering the time and effort participants are able to commit and thus building in options for different levels of involvement in different stages of the project, and the importance of building trust and transparency with the community(ies) we work with.

**What happens now?**

We have started contacting representatives of rural community trusts as suggested by PAS, DTAS, and others, and have had tentative conversations about the involvement of two communities. We will continue reaching out to communities and exploring opportunities for this project to be beneficial for them. Once we have established one or more communities to work with, we will create a core management team with members of the community. We will then collaborate with the community to develop a research topic, research questions, methods, data collection and analysis, and preparation of outputs that are built around their needs and aspirations for community land-based activities.

# Executive summary

This report is part of research ongoing in Work Package 1 in the Scotland's Land Reform Futures project contributing to the Scottish Government's Strategic Research Programme (2022-2027). The wider project will generate new knowledge regarding land reform, community land ownership, and engagement in land use decision-making, as well as enhance understanding of the role of land ownership and land reform in achieving net zero emissions and reversing biodiversity decline in Scotland.

The objective of the work reported here is to develop a ‘citizen science’ approach with one or more rural community(ies) of place to help build their capacity for collecting, analysing, and using data about land ownership, tenure, use patterns, and potential alternatives. It is hoped that such capacity will help communities to use land data to meet their information needs, solve problems and support community land-based activities, including developing evidence to support the utilisation of land reform mechanisms. In preparation for this project, we conducted a scoping review of literature on citizen science and its applications to topics related to land use and development. Key insights from this scoping review include the importance of conscientious collaboration with communities, that promotes reciprocal benefits for both the community and the researcher. This can include shaping the research topic, questions, methods and analysis with communities, around their needs and aspirations for land, the need to consider the time and effort participants are able to commit and thus building in options for different levels of involvement in different stages of the project, and the importance of building trust and transparency with the community(ies) we work with.

Using insights from this as a foundation, we prepared a proposed approach for this citizen science initiative, which we shared with the Stakeholder Advisory Group of the Scotland’s Land Reform Futures project, for feedback and advice. Subsequently, we consulted organisations, including Planning Aid Scotland and Development Trusts Association Scotland for advice and suggestions for community groups that may be interested in working with us. This initial work will guide us as we begin contacting and entering into tentative conversations with rural communities regarding their potential involvement in the project.

**Developing a citizen science initiative to support community land-based activities**

# Introduction

## **Background**

As part of the ‘Scotland’s Land Reform Futures' project, a ‘citizen science’ initiative is proposed to help build the capacity of rural communities of place to collect, analyse, and use data about land ownership, tenure, use patterns, and potential alternatives. It is hoped that such capacity will help communities to use land data to meet their information needs, solve problems and support community land-based activities, including utilising land reform mechanisms. The results from a [report on community access to land data](https://www.hutton.ac.uk/sites/default/files/files/Hutton%20-%20Community%20land%20data%20report%20-%20A_McKee%20%26%20A_%20Marshall%20revised%202_6_23.pdf) suggest that land availability is the paramount challenge facing communities in pursuing community land-based activities (McKee and Marshall, 2023). Adjacent to this, the recent Scottish Land Commission’s Strategic Plan emphasises the need to increase community agency in decisions about land and land use change, as well as diversifying forms of ownership and governance, in order to support thriving people and places (Scottish Land Commission, 2023).

The use of citizen science may be valuable in this context. Citizen science refers to a set of research practices that involve non-professional researchers, or ‘citizen scientists’ in various aspects and stages of the research process, ranging from contribution to data collection, through collaboration and consultation about the research, to in-depth co-creation of the research design and delivery (Bonney et al., 2009; Haklay, 2013; Land-Zandstra et al., 2021). It is considered a useful approach for facilitating open and transparent access to data, creating opportunities for community engagement, and encouraging learning and capacity-building for those who participate (Haklay et al., 2021; Vohland et al., 2021). As shown in a recent paper on the rural United States, citizen science has recently started to be applied to the context of land ownership and use and may be promising in facilitating beneficial change in this area (Shade and Van Sant, 2023).

## **Approach Taken**

This project initially involved a scoping review of literature on citizen science and its applications to subjects related to land. The insights from this review were subsequently used to develop a proposed approach for designing, initiating and conducting the citizen science initiative. This proposal was shared with and reviewed by the Stakeholder Advisory Group for the Scotland’s Land Reform Futures project. We have also consulted with several organisations (including Planning Aid Scotland, Development Trusts Association Scotland, and others) involved in community planning and development, for advice, and with a view to identifying a community who might like to take part in the project. We have subsequently contacted the communities suggested by these organisations and begun tentative conversations about possible involvement in the project.

## **Structure of the report**

The structure of the report is presented as follows.

1. Key Findings: This section is divided into three subsections:
2. Scoping review of literature on citizen science.
3. Proposed approach and feedback from the Stakeholder Advisory Group.
4. Consultations with organisations supporting community development.
5. Next Steps: The final section will explain the steps to be taken in the next phases of this project.

# Key findings

## **Scoping review of literature on citizen science**

Citizen science comprises a set of research practices that aim to facilitate open and transparent approaches to science, create opportunities for community engagement, and encourage individual and social learning (Haklay et al., 2021; Vohland et al., 2021). It does so through involving non-professional researchers, or ‘citizen scientists’ in various aspects and stages of the research process (Land-Zandstra et al., 2021). The involvement of citizen scientists can range widely, from contribution to data collection, through collaboration and consultation about the research, to in-depth co-creation of the research design and delivery (Bonney et al., 2009; Haklay, 2013; Land-Zandstra et al., 2021). The involvement of citizen scientists should have benefits both in terms of research interests and in terms of learning and other impacts for the citizen scientists themselves (Land-Zandstra et al., 2021). If done well, citizen science can be valuable for achieving social and environmental impacts (Senabre Hidalgo et al., 2021; Vohland et al., 2021). Whilst greater involvement of citizen scientists does not necessarily result in more impactful scientific research, it can help to make research projects more effective in meeting the needs of local people (Chiaravalloti et al., 2022).

Although citizen science may be valuable in achieving social and environmental impacts, care must be taken, however, to ensure citizen science processes are worthwhile for those who engage in them and do not either reinforce existing power imbalances and inequalities, or exploit people who give up their time and energy, usually without payment (Chiaravalloti et al., 2022; Land-Zandstra et al., 2021; Moustard et al., 2021; Vohland et al., 2021). Enabling participation of people with limited time and resources is therefore a particularly strong challenge (Vohland et al., 2021). Another challenge relates to the data quality produced through citizen science. Although citizen scientists may be perfectly competent, their lack of professional experience and expertise, as well as potential for bias towards personal and collective interests in the research topic, may have a negative impact on the data collected (Senabre Hidalgo et al., 2021). This can negatively affect the credibility of data and findings produced through citizen science.

Taking these insights, as well as suggested best practices for citizen science, we have incorporated the following considerations in our proposed approach to citizen science, to help encourage positive impact and mitigate potential challenges:

* Involvement of citizen scientists must be sensitive to the amount of time and effort they can put in, to avoid reinforcing systems of exploitation.
* Uptake and engagement of citizen scientists can be encouraged by ensuring there are opportunities to be meaningfully involved in the generation of new knowledge and authentic scientific outcomes, as well as to generate social and individual benefits.
* Creating a range of options for flexible engagement can help to encourage the participation of people from a range of social and economic backgrounds.
* To manage potential challenges around data quality, it is important to build trust through longer-term engagement, provide adequate training for citizen scientists, maintain consistent engagement and dialogue between professional researchers and citizen scientists, and use methods of data collection that encourage transparency.
* Results, data and metadata should be presented in as open and transparent a way as possible, including through Open Science.
* Projects involving citizen science should be evaluated on the quality of their scientific output, data quality, experiences of citizen scientists, and wider societal or policy impacts, not just on scientific outcomes.

## **Feedback from the Stakeholder Advisory Group**

Following this scoping review, we prepared an initial project proposal, which was presented to the Stakeholder Advisory Group (SAG) for the Scotland’s Land Reform Futures project. SAG members were asked to consider discussion questions regarding: their overall thoughts about the proposal, community information needs in relation to land, potential opportunities and challenges regarding the project, and suggestions for where and with whom the project could be rolled out.

The responses from SAG members were generally positive and supportive of the proposed project, and also provided some constructive points for improvement. One SAG member emphasised the importance of considering the spatial scale at which the project would focus and suggested it may be interesting to engage with a community of place where there were multiple arrangements of land tenure and ownership. Another suggestion was that the aims of the proposed project matched with those of the Scottish Land Commission’s Strategic Plan, and that we could explore how the project could match up with community planning processes, such as Local Place Plans and Community Action Plans. Other suggestions included utilising methods such as video diaries and photographs as part of the project, investigating existing principles for engaging with communities around land reform, and including consideration of a range of different types of community land-based activities.

All of these suggestions were taken into account in project development. The suggestion to connect with ongoing community planning processes was valuable, and the project team subsequently engaged with organisations including Planning Aid Scotland (PAS) and the Development Trusts Association Scotland (DTAS) to identify potential areas of complementarity with their work, as well as potential communities to engage with. The revised project proposal is outlined in the following section.

## **Proposed citizen science initiative within the Scotland’s Land Reform Futures Project**

Guided by insights from the above scoping review and consultation with the SAG, we intend for each stage of the approach to be developed and implemented iteratively, in collaboration with stakeholders (i.e. representatives of the community of place).

*1) Identify issues of concern and related societal benefits that the project could help achieve.*

The overall rationale for this project is to explore how communities can use land and land data to help them solve problems. Considering the aforementioned [report](https://www.hutton.ac.uk/sites/default/files/files/Hutton%20-%20Community%20land%20data%20report%20-%20A_McKee%20%26%20A_%20Marshall%20revised%202_6_23.pdf%22%20HYPERLINK%20%22https%3A//www.hutton.ac.uk/sites/default/files/files/Hutton%20-%20Community%20land%20data%20report%20-%20A_McKee%20%26%20A_%20Marshall%20revised%202_6_23.pdf) on community access to land data, we propose that this citizen science initiative could focus on exploring land availability and opportunities for land to become available for community activities, through collecting data regarding land tenure, use and unuse, and possible land capability for community activities, as well as potential liabilities and assets associated with land. Specifically, we suggest utilising citizen science to address the following research aim and questions:

* Aim: To explore opportunities for how land has and could become available for community activities.
	+ What land-based assets exist in the local area?
	+ What tenure arrangements are they under?
	+ Are these land assets used? If so, how?
	+ If unused, what could they be used for?

Potential benefits for the community include: (i) the creation of a repository of data regarding land assets and their tenure, land use information, and areas of unused land; and (ii) a report, statement, and/or map of community aspirations for how land assets could be used to benefit community needs/aspirations. We hope that these outputs will support the community in processes of community place planning, including applications relating to land acquisitions, strengthening community agency in land-related decision-making and governance, engaging with land management planning undertaken by landowners, and/or for record-keeping and improving transparency. Other benefits, for the citizen scientists in particular, include skills associated with mapping and using spatial data, qualitative interviewing and analysis skills, as well the use of official registers. Benefits from a research perspective include: (i) more accurate data regarding land tenure, ownership, use, and assets, through the incorporation of local knowledge; (ii) greater understanding of community relationships with and aspirations for local land assets; and (iii) an assessment of motivations, barriers and opportunities for community land acquisitions and wider land reform.

*2) Identify a community of place.*

Informed by the issues of concern identified above, we will identify where and with whom the project will take place. We aim to identify a community who would benefit from improved capacity in using land data to support community land-based activities. We intend to work at a small scale, initially, with a rural community group (or representatives of different groups) who are interested in acquiring or using land for community-based activities, but who are facing challenges in doing so, and where there are multiple landowners, different ownership/tenure arrangements, and/or divergent land uses. Considering the importance of trust and transparency in citizen science, we intend to build a partnership with one or two communities of place, and to develop and implement each stage of the project iteratively, in collaboration with them. We will identify a relevant and willing community of place by collaborating with organisations involved in supporting community planning and development to scope communities engaged in processes of community place planning, especially those preparing or thinking of preparing ‘Local Place Plans’.

*3) Recruit citizen scientists and form a management team.*

A team of citizen scientists will be recruited from the selected community of place who can contribute to the research. This will be accomplished through utilising existing contacts and/or publicly available contacts to propose the initiative and arrange a short consultation meeting with representatives of the community. This meeting will be advertised through community online forums, noticeboards, and other local media. The consultation meeting will involve proposing the initiative and seeking feedback and input from the community regarding the research questions. It will also include proposing and developing opportunities for different levels and types of involvement (e.g. data collection, consultation, analysis, being part of the management team, etc). This meeting will culminate in the creation of a ‘management team’, formed of researchers from the Scotland’s Land Reform Futures project and representatives from the community of place, which will be responsible for supporting the implementation of the initiative. Attendees at the meeting will be invited to take part as citizen scientists, and further calls for participation will be made through utilising their contacts and advertising through local media.

*4) Develop research protocols, data collection tools and train citizen scientists.*

A suitable methodology will then be developed to respond to these research questions. This will be refined through collaboration with the community. We expect this to involve the collection of spatial data regarding land assets, land use and aspirations, as well as archival data regarding tenure, and qualitative data regarding community aspirations for land. Land use data may include information about land tenure and land use. These data may be collected through digital mapping tools, using a mobile app on tablets, as well as protocols for accessing archival data. Qualitative data regarding aspirations for community land-based activities and challenges faced in achieving them, may be collected through interviews, possibly including visual methods such as video diaries and photovoice. Research protocols will be developed collaboratively between citizen scientists and professional researchers. Citizen scientists will also receive training from professional researchers. This will most likely involve a half-day meeting to introduce and run through the research protocols and data collection tools, as well as general best practices in research (e.g. ethics, rigour, questioning styles etc). This will also be an opportunity for citizen scientists to ask questions and provide further feedback on the methodology.

*5) Data collection.*

Citizen scientists will then commence data collection, supported by the management team. As per this proposal, data collection may involve citizen scientists doing the following activities:

* Mapping land assets and land use via digital mapping tools on an app, using tablets.
* Compiling existing archival land tenure information and calibrating this against their local knowledge and findings from the spatial data.
* Conducting qualitative interviews, including the use video diaries and photovoice.

Data collection is expected to commence in Summer 2024 and last for approximately 6-8 months, after which we will collaborate with the citizen scientists to analyse the data. To facilitate this collaborative analysis, we will explore the possibility of creating a data sharing agreement and shared collaborative files, whilst ensuring data is stored securely in line with James Hutton Institute and GDPR-compliant procedures.

*6) Data analysis and reporting*

Data will be analysed collaboratively by professional researchers together with the citizen scientists. This may involve collating spatial and archival data into a data repository and set of maps. These would be shared with citizen scientists, before being finalised, with a proactive request for them to provide feedback on the interpretation and presentation of the data. Qualitative data from interviews would be transcribed and analysed thematically in NVivo. Analysis of qualitative data will be led by professional researchers with input from citizen scientists regarding the formulation and interpretation of analytical themes from the data.

The different sources of data will be collated into a report, or other output of use to the community, giving details of opportunities for how land has and could become available for community activities, if this is the purpose of the project agreed with the citizen scientists. Drafts of outputs will be shared with the citizen scientists for suggestions and revisions, before being finalised as an accessible community resource.

7) *Evaluating community capacities*

Considering that our aim for this citizen science project is to help to build community capacity for using land data, we also intend to assess the value of this approach for the community(ies) involved, alongside the citizen science project itself. To do this, we will focus not just on establishing whether an effect occurs, but will follow if and how effects develop throughout the process, through design, interaction and emergence (Bhola, 2000; Cornwall and Aghajanian, 2017). Specifically, this will involve:

1) Interviewing the participating citizen scientists before the project commences to ascertain their needs in terms of capacity for using land data, their aspirations for community land-based activities in their community, and what they hope and expect the project might achieve.

2) Maintaining regular communication with the citizen scientists during the course of the project, both to enable them to feed into the design, development and implementation of project activities, and to check their degree of satisfaction with the activities in relation to their aims and expectations.

3) Interviewing citizen scientists again at the end of the project, to explore the extent to which the project resulted in desired effects, as well as any emergent effects that had been challenging or surprising, and how positive change could be sustained.

## **Progress on recruitment of citizen scientists**

Having received a favourable ethical opinion for the proposal outlined above, we have now started contacting potential communities to work with. A shortlist of potential communities was identified through consultation with PAS and DTAS, and relevant community groups and trusts have been contacted through publicly-available email addresses. We have already received some interest from several community trusts and have begun tentative conversations with their trustees about potential involvement in the project.

# Next steps

In Year 3 of the Scotland’s Land Reform Futures project (April 2024 – March 2025) we will build working relationships with one or more communities, depending on how many express an interest in the proposed project, and work together with them to further develop and initiate this citizen science project. Specific steps to be undertaken include:

* Early-stage conversations and meetings with communities to explore if and how the proposed project may be interesting and useful to them.
* Interviews with prospective citizen scientists to explore their aspirations for land use in their community, as well as how land data may help them to achieve these aspirations.
* Setting up a management team for the project and conducting further recruitment of citizen scientists, within the specific community(ies).
* Developing research questions, data collection methods, and identifying training needs for citizen scientists.
* Preparing and submitting an application for ethical review for the data collection methods, together with the citizen scientists.
* Providing training for citizen scientists.
* Commencing data collection.

Data collection and analysis will continue through Year 3 and Year 4 of the project, with outputs from the research to be prepared by the end of Year 4 (March 2026).

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