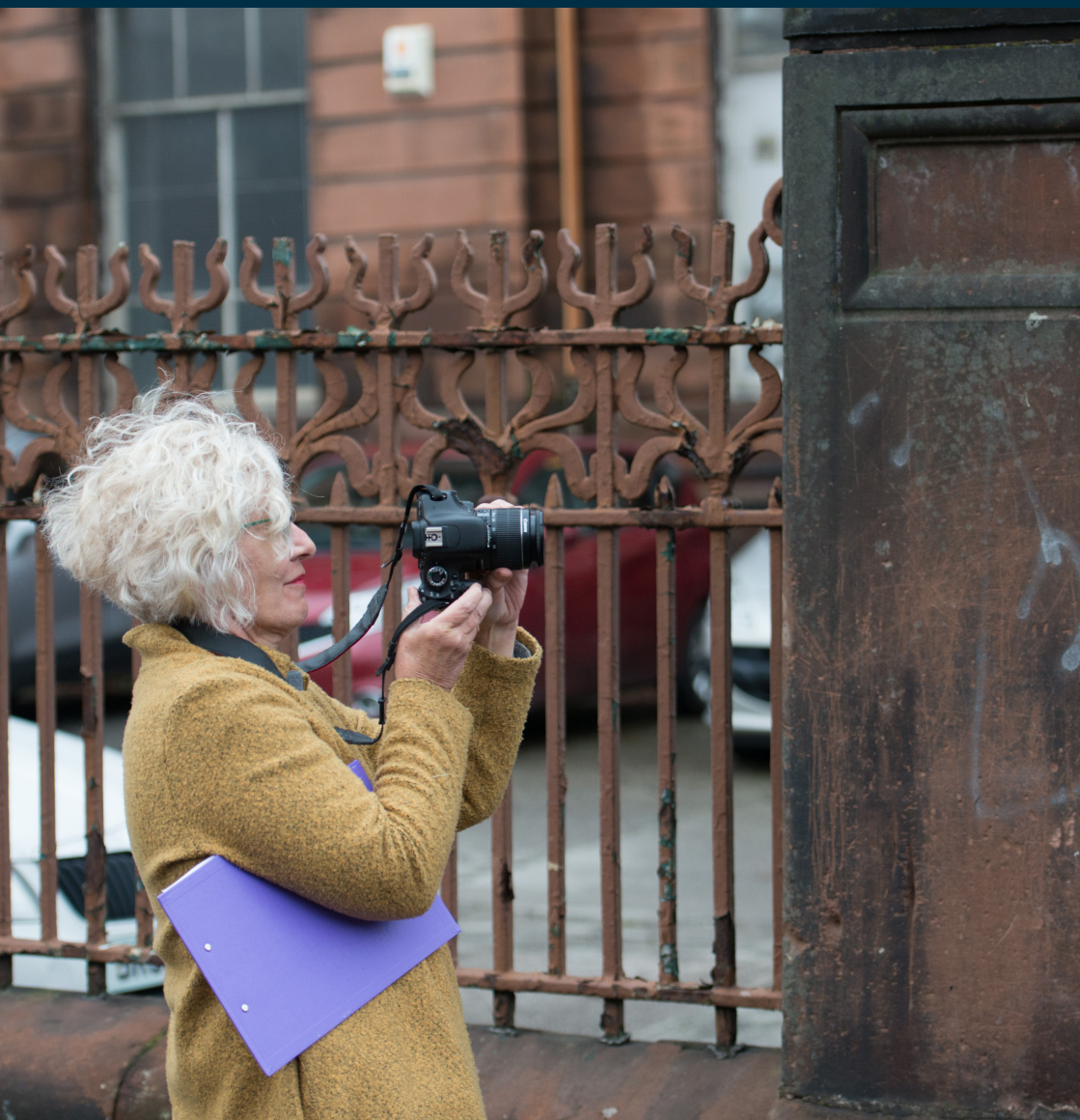
INFORM

CITIZEN SCIENCE



CITIZEN SCIENCE

Citizen science is an increasingly popular approach to engage a group of volunteers to contribute to scientific research. This is a subcategory of crowdsourcing (see below). Citizen science projects often involve communities designing studies, collecting or analysing data. This guide will focus on the use of citizen science within heritage and conservation and has been developed to help community and heritage groups who have access to a network, or wish to grow a network of, volunteers. It has been created to highlight some of the best practices and techniques for setting up projects. It underlines issues that should be considered before, during and after the creation of a citizen science project to ensure best results.

Exploring historic sites is a popular pastime which creates great potential for creating citizen science projects that align with visitors' interests – in a similar manner in which archaeology projects commonly engage volunteers and community members.

Why is citizen science useful?

Visitors and volunteers can help monitor, capture or analyse things that can't necessarily be achieved by one team. It can allow organisations to reach beyond their usual limits and create an opportunity to draw on outside expertise. Citizen science can create meaningful experiences and opportunities for the public to engage with our heritage, whilst undertaking tasks that assist in its care or management. Knowledge is shared between institutions and communities that create it and can generate or renew trust.

Citizen science in heritage and conservation

There have been many digital and physical citizen science projects within heritage and conservation. Here are some examples to show the variety:

- MicroPasts is a free and open source crowdsourcing platform that supports massive online data collection and analysis focusing specifically on the human past (e.g. for researchers in archaeology, history and heritage).
- The Scotland's Coastal Heritage at Risk Project enlisted hundreds of volunteers to carry out condition surveys of coastal heritage sites at risk of erosion.
- The Cairngorms Scenic Photo Posts project requests photos of the landscape, taken from specific spots, in order to monitor landscape change over time.

Crowdsourcing is the practice of engaging a group of people to contribute to a project. This can take many forms and can include tasks like transcription, description, idea-generation or voting. With the internet, public participation in projects has become easier and crowdsourcing is increasingly used by organisations to involve communities in their work. MyCanmore is a good example of a platform that uses crowdsourcing to generate content for Scotland's National Record of the Historic Environment, allowing members of the public to contribute to this resource for the common good.

Example of a successful citizen science project:
The Monument Monitor project, run by Historic Environment Scotland, asks visitors to heritage sites to take and submit photographs of specific areas, to help with ongoing conservation monitoring. This has helped with observing the effects of climate change, biodiversity and the visitor experience.

- Royal Botanic Garden Edinburgh uses the online platform Zooniverse to ask volunteers to help digitise their records of herbarium species representing two thirds of the world's fauna.

Within heritage, volunteers could be engaged to help with:

- Tracking conservation issues, such as plant growth and masonry damage;
- Monitoring antisocial behaviour at heritage sites, such as littering;
- Understanding how communities interact with and value their local heritage (Fig. 1);
- Recording the effects of climate change and extreme weather events;
- Updating records of the historic environment.

Planning your project

Who?

The design choices of any project, intentional or unintentional, will vastly affect the demographics of participants. Diverse volunteer groups are one of the key strengths of citizen science projects; different people will have experiences and opinions on the subject matter in areas where they were previously under-represented. In general, the more complex the task, the smaller the pool of participants

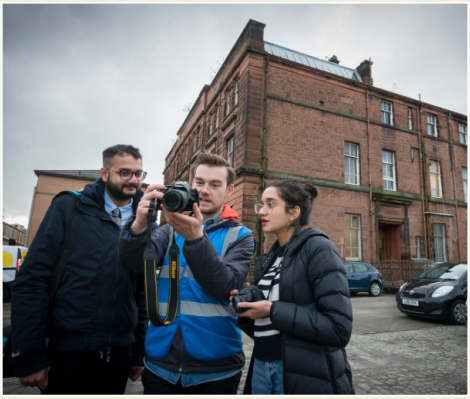


Figure 1: Volunteers working on a community photography survey as a part of Scotland's Urban Past project.

will be. This is not necessarily a drawback, especially if a project is focused on a small, local community. When designing a project, think about each of the potential barriers to participation and try and break them down. Where this cannot be done - for example, when a project requires volunteers to walk over rough terrain - ensure this is clearly communicated, so that volunteers are informed and prepared. Consider how to accommodate different age groups and demographics - for example, single mothers who have greater childcare responsibilities, the elderly or the young.

Accessibility requirements and considerations:

- **Time** - Consider if you can make your project available to people with limited free time, especially during the week.
- **Online access** - Where a project is online, ensure web accessibility standards are met and think of ways to engage volunteers who cannot easily access the internet.
- **Digital ability** - Where volunteers are not highly literate with digital tools, consider training

Figure 2: Volunteers were trained as part of the Sanday archaeology group monitoring coastal erosion around Orkney with the SCAPE Trust.

sessions which will help and benefit them (Fig. 2).
- **Physical access** - Where a project is on-site, consider how easy it is to access with public transport and for people with access requirements, such as wheelchairs. Also think about the time of year in terms of weather considerations.
- **Financial access** - Consider how to cater for potential participants who perhaps cannot afford to pay for fuel/ public transport to access a project or for childcare costs.
- **Language requirements** - Consider those that may require translation services or British Sign Language (BSL).

When running your project, ensure that you consider how to keep volunteers engaged and value their input and time by:
- Ensuring any instructional guidance is clear.
- Providing an easy way for volunteers to give feedback.
- Actively engaging with volunteers to create a welcoming environment.
- Co-designing tools with participants to make your project more inclusive.
- Ensuring any outputs of the project are accessible to participants, to make it more rewarding for them.

Why?

It's important to clearly establish the 'why' of any project before starting the planning process. Will the task you are thinking of doing benefit from the work of a group of people, and why should the group of people give up their time? If you don't have clear positive answers to why, it may not be appropriate for a community project.

Volunteers' time and their contributions should be respected, and citizen science projects should always deliver a level of mutual benefit to volunteers. Examples of these could include:
- Access to historical collections
- Creation of community
- Training and skill sharing
- Greater understanding of subject matter

Citizen science projects do not necessarily save money. Time saved on data collection and analysis will often be spent on community engagement and outreach (Fig. 3). Therefore, they should never be viewed as a cost cutting exercise.

It's also important to think about why volunteers will contribute to your project. There are many reasons why people participate in citizen science projects. Participants in community-based monitoring are often driven by a desire to contribute to valued scientific discovery, raising awareness of local issues and filling data gaps. At Monument Monitor, it was found that 43% of participants were motivated to contribute to scientific research and 30% were motivated by an interest in

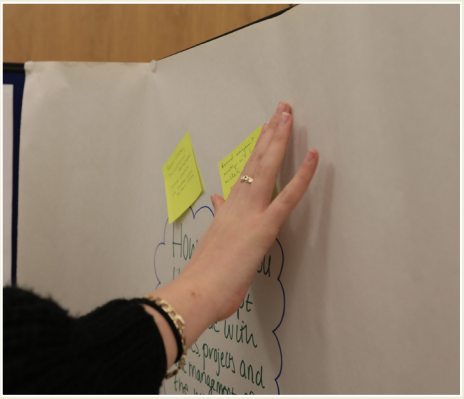


Figure 3: Outreach project to understand community values of local heritage.

conservation. Communicating results of work is often a stronger motivation than reward and recognition.

How?

Data first

Citizen science projects often involve creating new data (collecting and gathering) or generating data on existing sources (analysing and tagging). Before any project commences, it is best to plan carefully how this data will be sorted and analysed. For example, a citizen science project monitoring biodiversity and the encroachment of invasive species at a heritage site might include images tags such as "Himalayan balsam", "Invasive plant" and "Impatiens glandulifera", which could all refer to the same thing but would be difficult to assimilate. When creating a task, make sure that you clearly outline any specific categories to help you later on.

If volunteers are collecting data, consider how it should be stored so that it can be easily analysed. This could involve creating a database or outlining a comprehensive file structure with a naming convention so that digital files are easily accessible.

Top tip: when you are setting out your project and planning your data storage, you might find it helpful to use dates with the year first to help order files over a period of time, i.e.:

- YYYYMMDDFileDescription.Extension

Having the year first, instead of day or month, makes the file much easier to order and sort over periods longer than one month.

If you are collecting paper records, ensure you have a clear and logical filing system that other people can use. Taking time to do this before you have data will save you hours later.

Privacy and GDPR

It is likely within your project that you will collect personal identifiable data, such as the names and email addresses of your volunteers. Make sure you abide by General Data Protection Regulations (GDPR) and get informed consent before collecting and using any such data. For more information on this, check out the Information Commissioners Office (ICO) website.

Creating the project

When it comes to creating the project tasks, start by outlining the project challenge and goal. For example:

Challenge: Keep track of invasive species in local historic cemetery.
Objective: Create a community of people who regularly take images of the cemetery and submit them to the project.
Then think about how you can create tasks for a community group to help achieve your objective. When creating tasks, ensure that they are:

- **Specific** - instructions should be

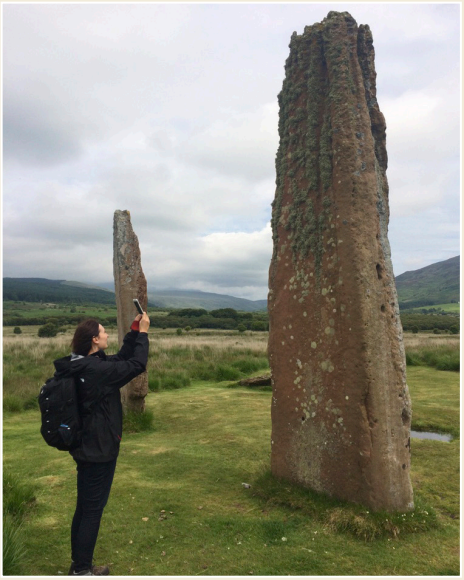


Figure 4: Taking images at Machrie Moor is an achievable task for visitors.

clear and easy to understand
- **Measurable** - they can be easily analysed
- **Achievable** - they can be carried out without too much difficulty (Fig. 4).
- **Realistic** - setting unrealistic goals that cannot be met can be demoralising for teams. Ensure that you can achieve with the resources at your disposal.
- **Time bound** - creating a defined set period gives structure to project that can help engagement.

The main resources for most citizen science projects can often be condensed down into people, technology and financial resources. Consider what you have at your disposal and how you can utilise these resources to address the challenge and achieve the objective. For example, utilising a volunteer's technical ability to reach out to local residents on social media to ask them to take and email images of the local cemetery. Within the scope of your resources, plan how to manage the project, content, community co-ordination and data organisation, and analysis and communication of results. As well as creating a new group of people it is also a good idea to reach out to any existing community groups who may enjoy a new challenge.

Follow up

Ensure to inform and update project participants about any outcomes of the project, as it is important to let people know how their work is being used. This could be through a newsletter, social media post or even a publication.

Tools to use

There are many different tools you can use to help create citizen science projects; here is a small selection:

- Zooniverse – a platform where you can easily create online projects in which volunteers can tag, transcribe and annotate digitised data sets: https://www.zooniverse.org/
- National Biodiversity Network (NBN) list of resources and toolkits: https://nbn.org.uk/tools-and-resources/nbn-toolbox/
- Citizen science toolkit designed by US government: https://www.citizenscience.gov/toolkit/howto/#
- Pybossa – a technical framework you can use to create your own project (requires technical knowledge): https://pybossa.com
- Talking About Heritage, a toolkit for getting engaged with your local heritage: https://www.historicenvironment.scot/advice-and-support/communities/talking-about-heritage/

Further reading

There is a lot to citizen science that we cannot go through in detail in this leaflet. If you wish to find out more, here are a few resources:

This leaflet has drawn from The Collective Wisdom Handbook, a crowdsourced document created by people with experience in creating citizen science and crowdsourcing projects.

Find out more at:
https://britishlibrary.pubpub.org/pub/introduction-and-colophon/release/2

A free course created by UCL that introduces you to Citizen Science:
https://extendstore.ucl.ac.uk/product?catalog=UCLXICSSCJan17

Crowdsourcing our cultural heritage:
http://oro.open.ac.uk/39685/

Scotland's Citizen Science Portal, a resource put together by Nature Scot to share data and ideas around Scottish environmental citizen science projects.
https://envscot-csportal.org.uk/

For help and support to recruit volunteers visit the Make Your Mark in Volunteering Campaign website
https://makeyourmark.scot/

Past Forward, Stories of Scotland's Urban Past contains ideas to help you get started on your own community group project:
https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=b3df2e3e-506f-4f33-a320-aafe00ee7452

Citizen science projects to try

Monument Monitor: **www.historicenvironment.scot/monument-monitor**

MicroPasts: **https://crowdsourced.micropasts.org/**

Finds Hub: **https://finds-hub.org/**

Further information

For information and resources for communities
W: https://www.historicenvironment.scot/advice-and-support/communities/
E: developmentandcommunity@hes.scot

For information on HES's Monument Monitor Citizen Science project:
E: MM@hes.scot

For information on HES Grants:
T: 0131 668 8801
E: grants@hes.scot

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THE ENGINE SHED

The Engine Shed is Scotland's buildings conservation centre. Run by Historic Environment Scotland, it is a hub for everyone to engage with their built heritage. We offer training and education in traditional buildings, materials and skills. For more information, please see our website at www.engineshed.scot or email technicaleducation@hes.scot.

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