UKEOF
ENVIRONMENTAL OBSERVATION FRAMEWORK

Impacts of COVID-19 on UK environmental citizen science

Lessons learned and recommendations for the future

Summary

The Covid-19 pandemic and government responses during 2020 and beyond has had unprecedented impact on individuals and society. It has also had an impact on environmental citizen science. Here we report on an analysis by UKEOF partners that explores how the response to Covid-19 has affected environmental citizen science in the UK. It includes lessons learnt, opportunities for UKEOF partners and recommendations for the future; covering the need for partners to respond strategically, to develop and strengthen strategic partnerships, enhance communication with participants and actively promote activities suitable for people to do from home.

UKEOF Citizen Science Working Group

What happened?

The involvement of volunteers in environmental citizen science has a vital role in scientific research and education, and in the UK it helps meet our needs for environmental monitoring.

In March 2020 the UK, along with many other European counties began to restrict movement and in-person interactions in response to the emerging coronavirus pandemic – we refer to these as '2020 lockdown restrictions'. The COVID-19 pandemic has led to significant loss of life and has had severe economic repercussions across the globe, including in the UK. The associated lockdown restrictions, however, had some positive consequences for the environment[1]. Globally, initial reductions in transport and industry led to significant falls in carbon emissions[2] and atmospheric pollution[3]. The media also reported on people's delight at the increased visibility of animals in locked-down cities and the increased awareness of nature near them[4]. People used cars and public transport less during the lockdown[5], and once lockdown restrictions were eased, visits to parks and outdoors spaces increased[6]. Over the first couple of months of lockdown in 2020, time spent on leisure activities increased on average due to reduced time spent travelling and the impact of furlough and redundancy[7], although time spent on childcare increased[8]. There was great variation between individuals and the longer term impact on time use remain to be seen. Thousands of people also volunteered to help their local communities[9].

During the period of lockdown restrictions in the UK during 2020 many people have reflected on the value of nature to them (helped by spring 2020 being the sunniest on record), the importance of green spaces close to where they live (although in some places urban parks were temporarily closed), and the links between engagement with nature and their wellbeing and mental health[10]. There was also increased reporting of the adverse effect that human activity can have in their local environment (e.g. fly tipping)[11]. During this time research was funded to look at the impacts of nature connections on wellbeing[12] and the long-term impacts of the lockdown restrictions on nature connectedness[13].

Throughout 2020 in the UK there was a complex and evolving public perception of science and scientists. Initially the profile of science increased as a consequence of greater media attention, including via the daily coronavirus briefings in the UK. While this is likely to have raised the importance of science in responding to our greatest challenges in the public consciousness, communication of science inevitably risked being politicised so that the long-term impact may not be entirely positive[14].

Citizen science activities were actively promoted during the summer of 2020, as activities that can be done outdoors alone or in socially distanced groups, or online. Currently there is no formal information about the impact of lockdown on citizen science participation although early indications indicated an increase in use of online citizen science platforms[15]. Citizen science also had a role in tracking symptoms (e.g. the COVID Symptom Study and app in the UK[16]). Elsewhere citizen science apps have been used by governments across the world (e.g. TraceTogether in Singapore[17]) to help trace and track the prevalence of the disease in the general population.

With regards to the environment, the lockdown restrictions affected environmental monitoring by government agencies and NGOs. The lockdown regulations and health and safety guidelines meant that many monitoring programmes requiring staff to be in the field or in laboratories were paused or reduced for several months from March 2020. This also affected monitoring

by volunteers: for example, the UK Butterfly Monitoring Scheme, National Plant Monitoring Scheme and Breeding Bird Survey, amongst others, were all suspended during the strictest period of lockdown during spring 2020. This will have created gaps in the data record and the impact of this will vary due to differences in the lockdown restrictions across the four countries in the UK. Some automated monitoring and garden based citizen science programmes continued. Indeed, while many people faced different challenges at work or home, many more people got involved in desk-based[18] or environmental recording schemes in gardens and open spaces, e.g. through iRecord or BirdTrack, as evidenced in changing patterns of reporting[19]. A wide range of activities, including structured recording with the Pollinator Monitoring Scheme, were actively promoted to those who could access gardens or green spaces[20]. Many of the monitoring programmes that paused have now restarted.

Here we collate what we have learnt so far, particularly with regards to people's engagement with nature and environmental monitoring, including their appreciation of the environment and willingness to actively engage with citizen based environmental monitoring programmes. We provide recommendations for environmental public bodies for the future of environmental citizen science based on the impact of COVID-19 and lockdown restrictions.

Analysis

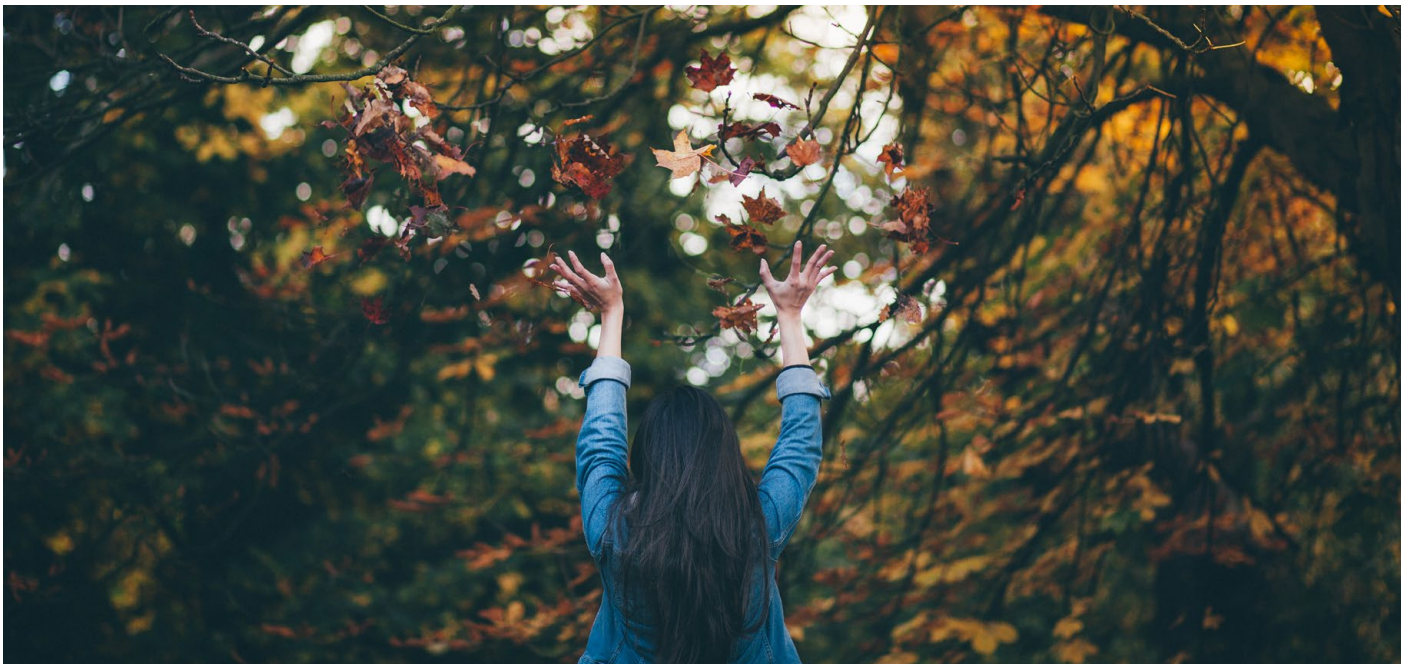
The UKEOF Citizen Science working group held a virtual workshop in May 2020 to discuss the impact of the pandemic on citizen science based environmental monitoring initiatives. The aim was to undertake a strategic assessment of the opportunities and barriers for citizen science in UKEOF partner organisations in the short term (period of lockdown restrictions) and the medium term (as lockdown restrictions are eased, but while there remains uncertainty about whether, when and how future restrictions might be introduced). This was edited to reflect the situation up to December 2020.

Methodology

Ideas were recorded using TOWS analysis[21] ('threats, opportunities, weaknesses and strengths') and then collated by the UKEOF Secretariat. TOWS is a variant of a SWOT analysis, but separates internal versus external factors and focuses on solutions. The ideas were collated to produce this briefing note. The note focusses on what we have learnt, what it means for citizen science, and actions we recommend that partner organisations should consider in order to respond positively to the societal impacts of the pandemic. The pandemic has potentially increased the importance of some existing recommendations and may also have helped reduce the barriers to the adoption of others. The note may also be of interest to anyone involved in environmental monitoring and citizen science at either a policy or practitioner level.

Potential impacts of the COVID-19 pandemic and lockdown restrictions on individuals

- There was a perception amongst workshop participants that the public profile of science had increased and, as people have engaged with the science of COVID-19 and its spread, there appears to be more familiarity with concepts such as uncertainty and the interpretation of graphs. It remains to be seen how long-lasting this is, how prevalent it is across the population, and whether it is transferred to other subjects (e.g. the environment or climate change). However the use of scientific results may also have become more politicised as lockdown restrictions have been eased and commentators have begun to question some of the Governments' decisions.
- Many people appear to have an increased appreciation of nature in general and a desire to engage with it[7]. This is subject to ongoing research[10].
- As people were forced to stay at home and encouraged to exercise locally during the strictest part of the lockdown there appeared to be a substantial increase in the use and appreciation of local open spaces and the local environment[4,5]. However, it was increasingly recognised that there are great differences and inequities between people in terms of access to green space, spare time etc.
- There has been a desire to support local needs through volunteering.
- Many people have remained at home, either working from home, or were furloughed or made redundant. There may be fundamental, medium term changes in people's working practices (e.g. increased working from home), and social connections (e.g. a greater desire to be involved with purposeful volunteering).
- There has been a dramatic increase in people's use of and familiarity with online communication tools (such as Zoom), both for receiving content, presenting and social interactions. This appears to include a willingness to access free and paid-for content from projects.



What does it mean for CS?

Citizen science provided resilience for some forms of environmental monitoring, especially in the face of disruption to professional monitoring. This is for several reasons:

- While the majority of field-based citizen science programmes stopped in March 2020, some home based monitoring activities such as the volunteer schemes to measure rainfall carried on as usual with minimal disruption.
- There was a substantial increase in home and garden-based activities[1].
- Many citizen science activities were able to quickly re-start when the more stringent restrictions were lifted. This was because of the dispersed and local nature of volunteer-based monitoring programmes; developing risk assessments and adhering to COVID-19 secure travel arrangements was far easier for this citizen science than for professional monitoring.

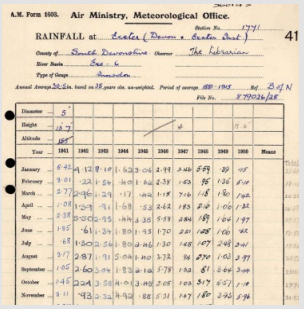
Citizen science quickly developed or expanded to meet increased demand. Garden-based environmental activities in particular proved very popular during the good weather in April and May 2020. Existing schemes were quickly expanded as people looked for things to do in their gardens. Bite-sized, online content made accessible via social media proved a popular way of engaging with people during this period when most people were spending a long time online.

The disruption of fieldwork has consequences that may impact the results. The breaks in many field-based citizen science environmental monitoring schemes during the lock down will have created gaps in long term monitoring records. There are likely to be analytical techniques that can help alleviate these issues, especially in England where travel restrictions were eased relatively quickly. Investment is required to apply these and test their statistical rigour, especially because some of these schemes contribute to the Defra Biodiversity Indicators. Differences in the nature and duration of lockdown measures between regions (and the potential for future local lockdowns) have resulted in different types and duration of data gaps which could lead to spatial bias in these impacts. If the disruption ends up just affecting a single year, the long term impact on the statistical rigour may be minor, but if some disruption remains for a longer period of time, improvements in analysis techniques will be important.

Case Study – Rainfall Rescue

A request posted about a rainfall rescue project seeking volunteers to digitize historic rainfall data was so successful that the data on all 65,000 available pages was transcribed by 16,000 volunteers, producing 5.25 million measurements covering 1677 to 1960 in a matter of a few weeks. Just a week after the start of the lockdown restrictions in March 2020, the *Rainfall Rescue* project was launched. Almost all of the rainfall records prior to 1961 were only on hand-written paper records; the records had been photographed but were not recorded in a database. So, a request was posted on the Zooniverse platform seeking volunteers to digitize historic rainfall data. It was so successful that the data on all 65,000 available pages was transcribed by 16,000 volunteers, producing 5.25 million measurements covering 1677 to 1960 in just a few weeks.

More: www.zooniverse.org/projects/edh/rainfall-rescue


A.M. Form 1603. Air Ministry, Meteorological Office.

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There was a desire to support people's engagement with local nature. While the lockdowns have emphasised the value of the local environment, government bodies such as Natural England do not have many staff to support community based activities. They may also not be the right people to do it. Government agencies are not structured or funded in a way that is conducive to delivering this type of activity. Mistrust of government organisations can also reduce the impact of such activities. This limits opportunities to 'bring nature to the people' by promoting citizen science as people increase their use of local greenspace. This task has therefore fallen predominantly on NGOs and other local organisations, although the financial impacts of the lockdown have left many NGOs financially vulnerable and it may be a challenge for some to respond quickly as the lockdown has eased.

The many home-based, or close-to-home, monitoring schemes have helped maintain volunteer engagement and complemented (rather than replaced) existing stratified sampling schemes. The popularity of home or garden based activities presents government and environment bodies with a great opportunity to get more people to connect with their local environment.

Opportunities for UKEOF partner agencies

1 The greater visibility of citizen science and local engagement with the environment during the pandemic offers the opportunity for agencies to influence and challenge internal principles/decision making systems so citizen science is seen as a societally important activity and not peripheral or simply 'nice to do'.

2 The willingness of organisations to try different ways of working, demonstrated over the period of lockdown, could be used to further embed citizen science within the strategies of environmental organisations (both government agencies and NGOs), particularly as they face potential funding challenges in the future. It will be valuable to use examples of where and how citizen science has been successful in the past.

3 The post pandemic "green recovery" provides a powerful justification for investing in local nature-based solutions as well as a source of potential funding for associated citizen science initiatives.

4 Citizen science offers value for money (though it is not free and needs appropriate resourcing long-term) and it could have a bigger role in providing resilience during similar events in the future as well as offering other benefits such as greater engagement and an increase in ownership of environmental issues by local communities.

How should Partner Agencies approach this?

Develop a strategic response within organisations

1 Develop strategic plans that reflect how citizen science can increase resilience in environmental monitoring in your organisation, especially considering the risk of other major disruptions in the future. Include consideration of the benefits for public engagement in the environment.

2 Select activities for the future (early 2021 and beyond) that build on the recent interest but respond to the changing challenges of the coronavirus pandemic and the economic impacts. How do we create extra capacity for citizen science for environmental monitoring?

3 Focus on existing activities, particularly internet based ones, and try not to introduce major new initiatives. Build on what works and expand existing schemes by promoting good practice. However, consider development of new internet-based approaches that would be beneficial for the medium and long-term engagement of volunteers.

4 Plan how to secure sustainable funding for current and new citizen science. This is important to provide resources for engagement and to support volunteers.

5 Promote and support further research to investigate the time-bound nature of the identified benefits and the potential for behaviour to revert to the pre-coronavirus patterns when restrictions are lifted.

Develop and strengthen strategic partnerships with other organisations

1 Develop a stronger forum of those involved in environmental citizen science across agencies and NGOs, for example expanding the networks supported by the Joint Nature Conservation Committee (JNCC), the British Trust for Ornithology, UK Centre for Ecology & Hydrology (UKCEH) and others for their monitoring schemes. An even wider group might have been helpful to share expertise in communicating with volunteers in the early stages of the lockdown and ensure that communication is consistent across the sector. It would also provide potential for a stronger voice to government about the value of this type of volunteering.

2 Work together with other organisations on demonstrating value and justifying citizen science activities. Develop metrics on wider benefits of citizen science (especially locally) in terms of trust, wellbeing, carbon emissions and so on, by building on experiences during lockdown etc.

3 Continue to work through third parties (e.g. NGOs) to help recruit new volunteers and engage a diverse range of people, including those with physical and learning disabilities and challenges with their mental health.

4 Consider how to develop and support 'champions' to help bring people together by linking people and activities, and how to do this virtually, while supporting local connections, as appropriate. Where appropriate to the organisation, develop stronger links with other organisations, especially locally.

Case Study - City Nature Challenge 2020 – DataBlitz

Over four days in April over 4,400 UK residents took part in the City Nature Challenge, uploading 62,859 biological records to the iNaturalist platform. A community in the UK came together online in May to help identify and classify these records. People were encouraged to join, whatever their knowledge of wildlife. It proved a great learning and online socialising opportunity, and a chance for people to do something new. The sessions were hosted by The Natural History Consortium, Natural History Museum, and the Field Studies Council, were free to join on Zoom.

More: https://www.bnhc.org.uk/bioblitz-type/uk-city-nature-challenge/

Enhance communication with participants

1. Develop clear communication plans and make the benefits clear so people can see why the activities they may become involved with are a priority to them personally as well as the greater good.
2. Consider communication campaigns around why looking after nature may reduce the risk of similar incidents in the future, enable people to help themselves and the planet, and generate more pro-environmental behaviours.
3. Gain support from communication experts about how to communicate appropriately and effectively. Communicate sensitively and with careful use of words, given people's potential anxieties and diversity of experience during the pandemic. For example, be cautious in describing changes as an 'opportunity'.
4. Consider more online engagement with volunteers, using new technology (video calls etc.) to engage with, motivate and recruit volunteers. Increased online tools and feedback to help observers / citizen science participants feel responsible for the quality of their data and improve it as far as possible, or engage others in the verification of this data. Ensure that this is accessible to a diverse range of people to reduce barriers to engagement. Meanwhile also consider how to enhance engagement with those who are less able or less comfortable engaging online.

Actively promote activities suitable for people to do from or close to home

1. When advertising citizen science opportunities, and without undermining established stratified sampling schemes, promote the environmental benefits of local recording. Volunteer 'champions' could engage with people in their local communities to promote their continued use of local green space using citizen science activities (e.g. biodiversity monitoring).
2. Promote more/existing in-garden or local citizen science options (e.g. biodiversity monitoring) – making clear how these add to existing activities and take advantage of more people being based at home and working flexibly. Use this to provide stronger links to people's local area and so incentivise citizen science, especially in non-hotspot areas, i.e. where we currently lack records or volunteers. Develop localised, bitesize, online content to support engagement with citizen science and make it accessible, e.g. via social media. Demonstrate that people can make scientifically valuable contributions, cheaply, locally and flexibly.
3. Emphasise (and gather evidence on) the benefits to participants in engaging in these projects – e.g. connections between participation and wellbeing. Be aware not to develop initiatives that might increase isolation or anxiety, e.g. time consuming, solitary online activities, but instead develop engaged, interactive social networks for those who would benefit from this.
4. Run projects with flexible participation, such as online citizen science, so that people who do have more spare time can access citizen science when convenient for them. This could include undertaking important, but previously low priority, activities, such as digitising old paper records via platforms such as Zooniverse.
5. Be careful not to exclude potential contributors if they don't have accessible outside space. We need to consider equity, inclusion and accessibility of environmental citizen science projects.

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