# Appendix 1: EU BON survey on citizen science data use among researchers in biological sciences

## General Overview

In order to obtain an overview over the citizen science data landscape in Europe, particularly the relevance and importance for collecting and analyzing biodiversity data, an online survey was developed in order to obtain crucial information for the further work on the EU BON European Citizen Science Gateway. The survey aimed to reveal trends of volunteer involvement among researchers in natural sciences, to explore the readiness and motivation of researchers using or not using volunteer help and to roughly evaluate the importance of citizen science and participation of citizens for the outcomes of research. The online survey “Assessing Citizen Science involvement in biological research” was conducted in February-March 2014 under the guidance of task 1.5 of EU BON work package 1.

The full report on the survey included 20 questions and is available online: <http://dx.doi.org/10.15156/BIO/100001>. The second part of the questionnaire contained additional questions for those participants that have already engaged volunteers in their work.

The survey was targeted to individual researchers rather than to organizations. Researchers were contacted by representatives of EU BON partners. Most responses came from academia (77%), non-governmental organizations (11%) or governments (9%) or related networks, only few from the business sector (1%, see **Table 1**). Ecology was the prevalent field of research of participants (**Table 2**). Overall, 151 researchers from 16 European countries responded to the survey, notable input came particularly from Norway, Sweden, Belgium, Estonia, United Kingdom, Bulgaria and Greece.

**Table 1**

|  |  |
| --- | --- |
| **Type of institution** | **%** |
| Academic (institute, university) | 77 % |
| Non-governmental organization | 11 % |
| Government agency | 9 % |
| Business company | 1 % |
| Other | 2 % |

**Table 2**

|  |  |
| --- | --- |
| **Field of research** | **%** |
| Ecology | 51 % |
| Environmental protection | 16 % |
| Biosystematics | 11 % |
| Molecular biology, microbiology, genetics | 4% |
| Agriculture | 1% |
| Other | 17% |

1. *In your research, have you used any help or data input from volunteers?*



1. *Would you use volunteer help/data input in the future? (All respondents)*



**Figure 1 a, b:** Overall involvement of citizen science in research

Our survey shows that almost two thirds of the respondents already include citizen scientists in their research, i.e. that they use the help of volunteers for conducting research. As can be seen from the graphs above (**Figure 1 a,b**), in most cases the willingness to use volunteers in the future is greater than actual engagement of volunteers in research at the moment. Furthermore, as the data shows, this gap is most obvious in the field of molecular biology and ecology and only to a lesser extend in the field of agriculture (**Table 3**). Participation of volunteers are already used to a large extent in the field environment protection and conservation, 76% already involve citizen scientists (Table 3). An analysis of European biodiversity monitoring schemes based on EuMon participatory monitoring networks study it was shown that almost 80% of the monitoring organizations were using help of volunteers in their work.

We were also interested in the reasons why researchers include volunteers in their research projects. The main reason why researchers use help of volunteers is the need to increase amount and variety of data (48% of respondents), so they are mainly used for data collection. The educational aspect is important for a much lesser number, 17% of researchers that educational aspects are also a reason for citizen science participation. Interestingly, one respondent commented, that sometimes the volunteer data is the only data source for research. However, there were also reasons for not engaging volunteers and the given answers were more diverse - for example that there are enough resources to do the research with only professionals (13%), engaging volunteers take too big efforts (12%), there are no capable volunteers (10%). Many respondents mentioned that their research topic is too specific or that the work is too demanding to engage citizen scientists; some researchers were concerned about the data quality of the collected data; some respondents were interested in using volunteers, but apparently did not have the opportunity or institutional support to engage them.

**Table 3:** Overall engagement of volunteers compared to willingness to engage volunteers in future, broken down by field of research of respondents:

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **N** | **Actual engagement of volunteers** | **Willingness to engage volunteers in future** |
| Agriculture | 2 | 50% | 50 % |
| Biosystematics | 16 | 56% | 63 % |
| Ecology | 76 | 59% | 90 % |
| Environment protection | 25 | 76% | 92 % |
| Molecular biology | 6 | 17% | 83 % |
| Other | 25 | 56% | 84 % |

There was also a quite significant variation in the number of volunteers that were engaged in the citizen science projects - and the number of engaged volunteers ranged from one to 40 000. However, the majority of researchers engaged between 1-100 volunteers (67%) and 40% of the researchers reported that 1-10 volunteers helped them. In comparison, In EuMon study with monitoring programs 27 % organizations engaged 1-100 volunteers, 25% organizations engaged 100-10 000 volunteers.

## How volunteers are involved

Most of the volunteers contribute to the research by collecting biodiversity data, either by (species) occurrence recording (36%) or assistive fieldwork (31%). Volunteers were also involved via crowdsourcing activities, like digitization. Some respondents also reported more complex involvement of citizen scientists such as for the project design or for doing laboratory analysis. Around 62% of researches who engaged volunteers also provided training for them and 61% had specific communication protocols to engage volunteers (in contrast to just passively receiving data or assistance).

## Accessibility of citizen science data

Researchers were asked about the accessibility of the provided data. As our analysis shows, for a large part of the data only restricted access is provided (23%). Only for around one fifth of the data a free and open access is provided (19%, **Table 4**).

**Table 4**

|  |  |
| --- | --- |
| Raw data can be downloaded under an open license or waiver | 19% |
| Raw data can be downloaded under a restrictive license (e.g. non-commercial, research only) | 8% |
| Raw data can be downloaded, but without a license (re-use must be requested) | 5% |
| Raw data cannot be downloaded but the data can be browsed online | 7% |
| Access to the data is restricted | 23% |
| Other | 8% |

Citizen scientists can also be motivated to publish research findings themselves. Open access publications would help to disseminate the results to broader community without costs to the readers but without research funding are often behind paywall for citizen scientists (Ng, W., 2016).

## Use of public data recording portals and applications

52% of researchers who engaged volunteers also use public portals for their data (e.g. for the data upload, data curation). There are numerous initiatives of websites and portals operating at the national and private level for citizen science-based biodiversity observation data and some offer not only repositories or tools for data curation but also mobile applications for data collection. No major favourite portal emerged from responses, but a few initiatives were mentioned more than once: eBird, iNaturalist, Anymals+Plants, Observado and GBIF (all global), elurikkus.ut.ee (Estonia), artportalen.se (Sweden), artsobservasjonen.no (Norway) and iRecord (UK). Of all counted names of portals there were apparently 23 national, while others were international.

## Satisfaction with citizen science data

Another important question was how satisfied the participants are with the data collected in citizen science projects. Most respondents rated the data as “satisfactory” which means it matched their needs with respect to data quality and quantity. 15% of the respondents even rated that they are highly satisfied with the collected input, only 7% were not satisfied with citizen science data.

## Conclusions

Citizen science data is important for generating knowledge on biodiversity in Europe. Hence, researchers use volunteer help in the data collection for biological sciences to a considerable amount and citizen science provides an important source for the generation of citizen science data. In some cases citizen science data was the only source of data available for researchers. The survey indicates that researchers would like to involve even more volunteers in their work, but recruiting process to allocate capable observers takes too long and consumes too much time and resources. Providing assistance and guidelines to researchers could help with the recruitment and managing of volunteers, but further development of monitoring approaches is needed that include plans and ways for a participation of volunteers. In addition to that, not only the human resources are often scarce, but also lacking funds often limit the capability for proper stakeholder participation.

Researchers in the field of environment protection were most inclined for citizen science involvement. However, there is a great potential for involving volunteers and for setting up citizen science initiatives that support data collection and analysis. As our study shows, ecologists showed most interest in prospective use of volunteers in their work in future. This is one of the target groups for leveraging integrate citizen science data. Including ecologically relevant metadata in citizen science observations could help ecologists more effectively utilize the data in order to obtain key information of the collected data.

Another important field of future action is the open access to citizen science data, as still only around one fifth of the data provides a true open access to the data. Open access is much encouraged in European science policies and attention should be paid to the fact that still a high percentage of citizen science data is only accessible under various restrictions.