Interreg North-West Europe
FABulous Farmers
European Regional Development Fund

Report: Review of current good practice tools and methodologies for FAB community engagement.

Deliverable WP 3 D2.1

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Project partners:

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1 Aim of the report

In the report of deliverable T3.2.1, we provide a review of good practice tools and methodologies that can be used to stimulate the engagement of the FAB community, serving ultimately a triple goal:

1. fostering the development of a good relationship between the citizens and the farmers, based on mutual understanding,
2. educating the citizens on the role they can play in the sustainable management of FAB, and
3. creating a favourable environment for the adoption and implementation of FAB solutions by the farmers.

Initially, definitions of important concepts, like "FAB community", "community engagement" and "levels of community engagement" are provided, in order to establish a common language.

Then a wide range of good practice tools and methodologies from the community engagement literature is introduced, which could inspire similar approaches in the context of the FAB community engagement.

Special attention is paid to the potential of Citizen Science as a tool to involve local citizens and FAB farmers in the monitoring of the effects of the implemented FAB solutions on FAB and the associated ESS. This might be a way to develop a better understanding of the potential of FAB solutions to increase the sustainability of the local agro-ecosystems and the benefits for the local society.

2 FAB community engagement

2.1 Definition of FAB community

The term "community" can be really ambiguous and it presupposes the acceptance of a particular set of values. It may refer to a **"community of place"**, grouping people which identify with a defined geographical area (e.g. neighbourhood, town, workplace, etc.), or to a **"community of interest"**, in which people share a common interest, passion, experience or characteristic (e.g. sporting groups, bird watchers, hobby winemakers, faith groups, people with disabilities, etc.). Reflecting on the definition of the term "community", Head wrote:

> "*It (i.e. the term "community") often implies a (false and misleading) sense of identity, harmony, cooperation and inclusiveness.*" (Head 2007, p. 441).

In the context of the FABulous farmers Project, the FAB community is defined as the entirety of the (actual and potential) FAB stakeholders present in a specific pilot region, as they were identified during the stakeholder mapping process (DT3.1.1; Basecamp: FABulous Farmers > Docs & Files > 3 WPT3 Embed > Material for stakeholder mapping).

Shortly, a FAB stakeholder refers to any group or individual that affects/can affect or that is affected/can be affected by the implementation of a certain FAB measure. This influence can

be either direct – via involvement in the application of the FAB measures at the field, farm and landscape level – or indirect – through the relationship of the stakeholder with the associated ecosystem services (ESS) and/or ecosystem disservices (ESD). During the stakeholder mapping process, the FAB stakeholders were identified as being part of at least one of the following five FAB stakeholder categories, which codify the relationship between a FAB stakeholder and another component of the developed FAB mind map (a systems approach-inspired visualisation of a FAB system; see **Figure 1**):

- **Owners**: The stakeholders who own the agricultural land and/or other land components of the surrounding landscape, where the FAB measures are or can be implemented.
- **Managers**: The stakeholders who implement the various FAB measures at the field, farm and landscape level.
- **Beneficiaries**: The stakeholders who benefit directly from the implementation of the FAB measures (*direct Beneficiaries*) and the stakeholders who benefit from either the enhanced delivery of the associated ESS or the decreased delivery of the pre-FAB ESD (*indirect Beneficiaries*).
- **Antagonists**: The stakeholders who are harmed directly by the implementation of the FAB measures (*direct Antagonists*) and the stakeholders that are harmed by the potential delivery of new post-FAB ESD (*indirect Antagonists*).
- **Influencers**: The stakeholders who promote the implementation of FAB measures that aim at the maximised delivery of ESS and/or the minimised delivery of pre-FAB ESD, by influencing the context of FAB implementation (through legislation, lobbying, financial incentives, etc.).

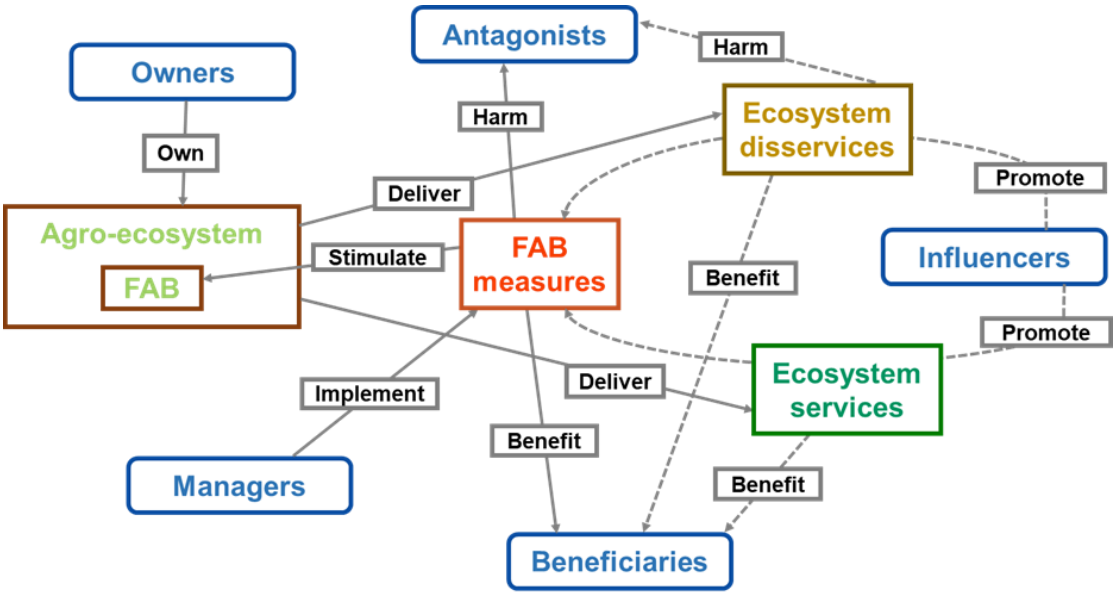

Figure 1. The FAB mind map

This deliverable focuses mainly on the wider public (i.e. the local citizens) of each pilot region, that, depending on the concerned pilot region, can belong to any of the above FAB stakeholder categories (or a combination thereof).

2.2 Definition of "community engagement" and levels of community engagement

Community engagement

According to IAPP, *"community engagement, or public participation, is a process that involves the public in problem solving or decision making and uses public input to make decisions. It includes all aspects of identifying problems and opportunities, developing alternatives and making decisions. It uses tools and techniques that are common to a number of dispute resolution and communication fields."* (IAP2 2010, p. 20).

Butteriss (2016) suggests that community engagement is both a process (how we do things e.g., ensuring that the community has a say in decision making) and an outcome (what we want to achieve, e.g. community building or involving stakeholders in the management of a natural resource).

The Community Engagement Triangle, developed by the Capire Consulting Group (2005), helps us to reflex on the triple objective of community engagement and encourages us to think about what we are hoping to achieve:

1. **Decision making,** which provides opportunities for communities to contribute to improved decision making
2. **Relationship development,** which involves building new relationships and/or improving existing relationships with or within communities
3. **Capacity building,** which is based on community strengths so that communities and individuals can enhance their ability to influence their physical, social, natural, economic and cultural environments

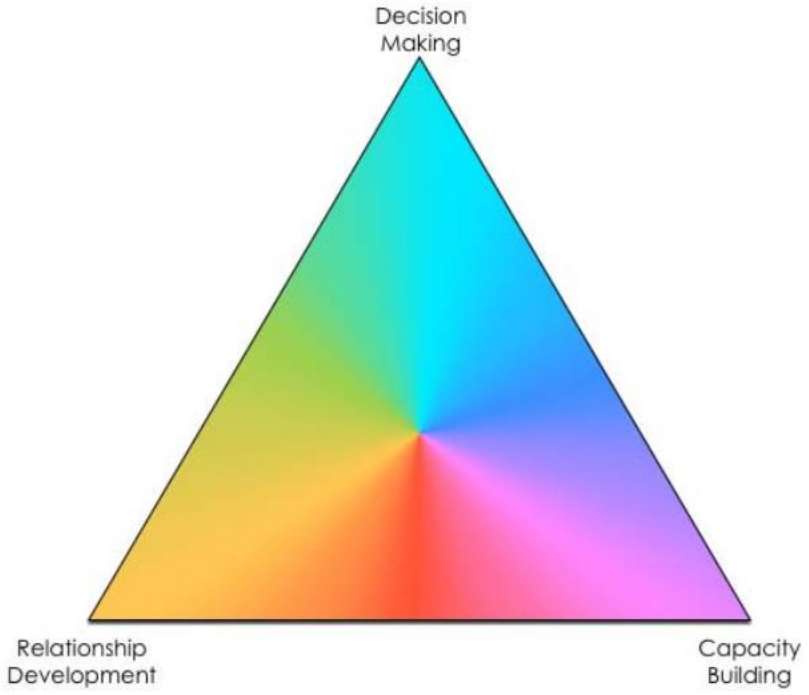

Figure 2. The Community Engagement Triangle (Source: Capire Consulting Group, 2005)

Levels of community engagement

Structured opportunities for community engagement, whether provided through official channels or created through direct group action, may be weak or strong, narrow or broad, episodic or continuing. It is widely recognised that there is a spectrum of possible participatory forms.

Much of the literature on forms of participation and community involvement in public issues has been summarised and usefully categorised in the work of the International Association for Public Participation (IAPP) (https://www.iap2.org/mpage/Home). In the IAPP Spectrum of Public Participation (see **Figure 3**), five levels of public participation (or community engagement) are identified: informing, consulting, involving, collaborating and empowering citizens. These constitute a continuum of participatory forms, from weaker to stronger forms. Each is associated with a clear objective and implicit promises, thus minimising ambiguity about the purpose and nature of the participation.

INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

Figure 3. The IAPP Spectrum of Public Participation

2.3 Why is "community engagement" necessary in the FABulous farmers project?

In the context of this project, community engagement is crucial in order to stimulate the interest of the wider public in the concept of FAB, with the ultimate goal of triggering the community members to explore in what ways they could contribute themselves to a more sustainable FAB management.

More specifically, the following arguments have been identified on why it is important to engage the wider FAB community in the activities of the FABulous farmers project:

1. increased diversity in decision-making bodies may lead to higher quality decisions that are better adapted to the local social-cultural and environmental contexts,

2. development of common ground, trust, and reduction of conflict between FAB community members, by stimulating for example the creation of good relationships between the citizens and the farmers, based on mutual understanding,
3. promoting social learning, where stakeholders learn from each other and build new knowledge while developing new relationships,
4. community ownership may increase support and successful implementation, and
5. the potential for reduced FAB implementation costs.

3 Inventory of good practice tools and methodologies

3.1 General tools and methodologies for community engagement

3.1.1 Research methodology

To undertake a comprehensive search for good practice tools and methodologies for community engagement in a repeatable, standardised way we did a review of academic and grey literature (with the use of the online database Web of Science and the Google search engine, respectively) using combinations of keywords such as: "community engagement", "public participation", "citizen participation", "stakeholder management", "best practices", "tools", "method*".

Furthermore, the identified tools and methodologies which were included in the respective inventory were categorised according to the 5-level categorisation scheme of community engagement of the IAPP (see **Figure 3**).

3.1.2 Inventory of general tools and methodologies for community engagement

Table 1 contains a compilation of tools and methodologies, as extracted from the sources below, per category of community engagement:

1. Petts and Leach (2000)
2. Community planning toolkit – Community engagement (2014)
3. Community engagement toolkit for planning-Queensland Government (2017)

Table 1. General tools and methodologies for community engagement

	Inform	Consult	Involve	Collaborate	Empower
Article(s) in local newspapers	✓				
Digital videos (e.g. YouTube)	✓				
Printed materials (e.g. brochures, newsletters)	✓				
Community events	✓	✓			
Public meetings	✓	✓			
Site visits (e.g. farm demonstrations)	✓	✓			
Social media (Facebook, Twitter, Instagram, etc.)	✓	✓			
Focus groups/forums	✓	✓	✓		
Hard-copy surveys	✓	✓	✓		
Interviews	✓	✓	✓		
Online surveys/questionnaires	✓	✓	✓		
Website	✓	✓	✓		
Workshops	✓	✓	✓		
World café	✓	✓	✓		
Citizens juries	✓	✓	✓	✓	✓
Planning for real	✓	✓	✓	✓	✓
Visioning	✓	✓	✓	✓	✓
Visioning on the Internet	✓	✓	✓	✓	✓

3.2 Citizen science

3.2.1 Introduction to Citizen Science

Citizen Science

According to the Oxford English Dictionary, citizen science is defined as *"scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions."*

A short immersion in the Ten Principles of Citizen Science, as developed by the European Citizen Science Association (https://ecsa.citizen-science.net), will help the reader to better understand what Citizen Science really is.

Principle 1: Citizen science projects actively involve citizens in scientific endeavour that generates new knowledge or understanding.

Although the history of citizen science often focuses on environmental sciences, a rich tradition of similar research approaches is found in disciplines as varied as astronomy, meteorology and public health. Participating citizens may act as contributors, collaborators or as project leaders and have a meaningful role in the project.

Principle 2: Citizen science projects have a genuine science outcome.

This can be, for example, answering a research question or informing conservation actions, management decisions or environmental policy. This genuine science outcome is exactly what distinguishes citizen science from pure education and outreach programmes. Citizen science projects – while also serving learning goals – are increasingly resulting in research publications in a wide range of discipline-specific journals.

Sometimes, however, a strong motivation to harness the public engagement benefits of citizen science can lead to scientific rigour being compromised (Robinson et al., 2018). Nevertheless, achieving and maximising science outcomes from citizen science projects is a cornerstone of this field and an essential element in maintaining trust with the citizens that participate.

Principle 3: Both the professional scientists and the citizen scientists benefit from taking part.

Benefits for the former may include: i) the support in data collection and/or interpretation, and ii) the publication of research outputs. The benefits for the citizen scientists can be more diverse and include: i) learning opportunities, ii) personal enjoyment, iii) social interaction, iv) development of new skills, and v) satisfaction through contributing to scientific evidence that can influence policy on many scales (locally, nationally, and internationally).

Principle 4: Citizen scientists may, if they wish, participate in multiple stages of the scientific process.

These stages include: developing the research question(s), designing the method, gathering and analysing data, interpreting and communicating the results.

With respect to the participants' level of involvement in the scientific process, Bonney et al. (2009) differentiate between:

- Contributory projects, where citizen scientists collect and contribute data,
- Collaborative projects, where participants help with the data analysis and may contribute to refining the project design,
- Co-created projects, in which citizens co-design the project together with scientists, and are involved in all stages of knowledge creation.

Broadly speaking, none of these three different types of citizen science projects is better or worse than the others, but they may vary in the ways in which they contribute to scientific

research because they differ in numbers of participants, intensity of time and commitment required by participants, and locus of control in terms of who is setting the research agenda.

A similar typology is that of Haklay (2013), which is based on the level of cognitive engagement and type of contribution.

"Crowdsourcing", where the citizens act as sensors, is the simplest form of participation, with little cognitive engagement and no citizen influence on the project design. Involving citizens in activities such as data collection and annotation is a way of harnessing their distributed intelligence ("citizens as interpreters"), whereas enabling them to contribute to the problem definition and data analysis leads to participatory science projects. In "extreme citizen science", citizens are empowered to collaborate with professional scientists on many core aspects of designing the scientific project – from problem choice to the interpretation of results – and on ensuring the relevance to their local context. This modality also opens "*the possibility of citizen science without professional scientists, in which the whole process is carried out by the participants to achieve a specific goal*" (Haklay 2013, p.12).

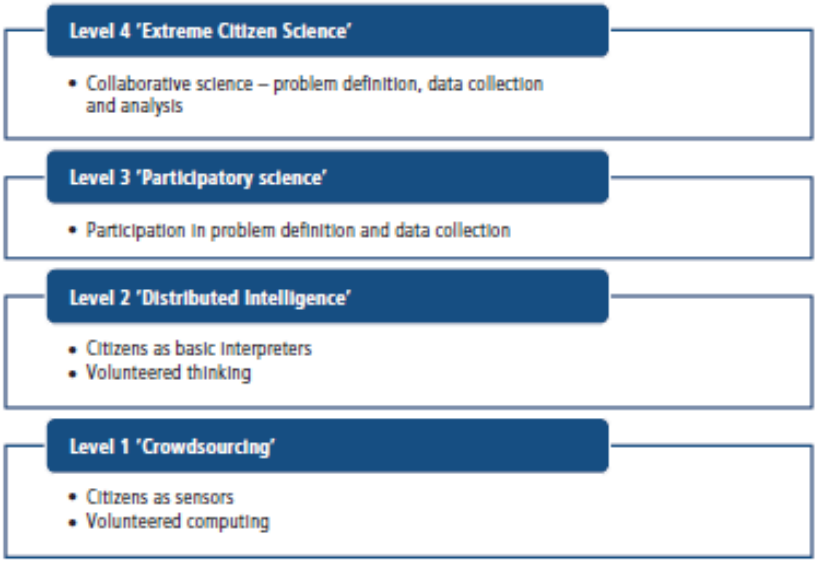

Figure 4. Levels of participation in Citizen Science (Haklay, 2013)

Principle 5: Citizen scientists receive feedback from the project.

This can happen via social media, websites, maps, e-newsletters, celebratory events, blogs and meet-ups. The provided feedback can relate to the end use of the collected data and/or the research, policy or societal outcomes.

Principle 6: Citizen science is considered a research approach like any other, with limitations and biases that should be considered and controlled for.

Advantages of this research approach include: i) Cost effective way to collect data with fine spatiotemporal resolution, ii) Potential for social learning for the participants, iii) Vehicle for democratisation of science. On the other hand, it might not always be an appropriate research

approach as: i) it requires a considerable investment in money, resources and time and ii) citizen science data are often criticised to be of lower accuracy, biased or of uncertain quality, with limited value for scientific purposes.

Principle 7: Citizen science project data and metadata are made publicly available and where possible, results are published in an open-access format.

Citizen science is an example of open science – a movement within the academia to make science research, data and outputs accessible to all. The data sharing may occur during or after the project, unless there are security or privacy concerns that prevent this. Other factors hampering the sharing of open-data include constraints concerning time, resources, infrastructure and incentives (Tenopir et al. 2011).

However, new technologies and increased availability of repositories for data and publications are making this process ever easier, and the opportunities afforded by opening up citizen science data are significant. There may also be a role for citizen science, and citizen scientists, in the wider sharing of project outputs and findings within and beyond the research community using non-traditional approaches. This could include non-science outlets such as local newspapers, NGO/association newsletters and special interest journals (e.g., gardening magazines).

Principle 8: Citizen scientists are acknowledged in project results and publications.

The contributions of citizen scientists are usually recognised throughout the lifetime of a project via project communications, the awarding of certificates or badges, events and many other routes. However, this does not always carry through to more academic project outputs. Acknowledging citizen scientists in project publications and other academic outputs is relatively easy to achieve but often overlooked.

Principle 9: Citizen science programmes are evaluated for their scientific output, data quality, participant experience and wider societal or policy impact.

The citizen science community should be encouraged to prioritise evaluation, including sharing details of less successful ventures, because the field cannot advance rapidly and effectively without self-reflection. However, project evaluation is quite often under-resourced, and as a consequence, some outcomes of citizen science projects are not completely identified, measured or reported (Ballard et al. 2017), despite their potentially significant scientific, societal, policy, community and individual outcomes. Time constraints, a lack of established evaluation criteria and a lack of understanding and confidence in how to conduct evaluation may prevent practitioners from collecting evidence of their successes and failures.

Principle 10: The leaders of citizen science projects take into consideration legal and ethical aspects of the project.

These include copyright, intellectual property, data-sharing agreements, confidentiality, attribution and the environmental impact of any activities.

3.2.2 Methodology for the citizen science inventory

To undertake a comprehensive search for citizen science projects or other participatory monitoring activities related to FAB and its related ecosystem services in a repeatable, standardised way we:

1. Undertook a review of scientific literature in the online database Web of Science, using combinations of keywords such as: "citizen science", "volunteer-based monitoring" "participatory monitoring", "community-based monitoring", "agricultur*", "agroecolog*", "ecosystem service*", "functional", "agrobiodiversity", "soil biodiversity", "pollinat*", "soil quality", "insect*", "natural enemies", "farmland birds", "decomposition".
2. Undertook a review of grey literature with the use of the Google search engine (www.google.com) and using combinations of the search terms mentioned above.
3. Scanned the below web portals hosting or listing citizen science projects
   - Scistarter (https://scistarter.com/)
   - CitSci (http://citsci.org)
   - UK Environmental Observation Framework (http://www.ukeof.org.uk/catalogue)
   - Zooniverse (https://www.zooniverse.org/projects?status=live)
   - BioCollect (https://biocollect.ala.org.au/acsa)
4. Asked project partners for inspiring examples they might be aware of.
5. Apart from the main inventory, we created also an inventory of indicators that could be used in citizen science projects or participatory monitoring activities in the framework of our Project. The inventoried indicators follow the categorisation of D.T.1.2.2 proposed by the projects partners from the UK Centre for Ecology and Hydrology for the indicators used for the yearly measurements/monitoring at the field level. The four monitoring topics include:
   1. Soil quality
   2. Pests & diseases
   3. Pollination
   4. Water quality & conservation

3.2.3 Inventory of identified Citizen Science projects/participatory monitoring activities

1. BeeHunt

Bee Hunt is a participatory science project on pollination ecology, with two major goals; one scientific and one educational. By building an extensive network of citizen scientists at different study sites across North America, it tries to address global hypotheses concerned with pollination such as whether pollinator services are declining or whether climate change is creating a temporal mismatch between bloom times and pollinator visits. The study sites include schools, parks, nature reserves, farms, gardens, and other areas of biological interest.

The participants, with the use of rigorous protocols, can collect, manage, and share very high-quality data. Their participation can take one of the following four forms:

1. inventorying pollinators at a site of their preference with the use of photographs,
2. comparing species in two patches,
3. providing nesting sites for mason bees and studying when they are active,
4. using bowls and soapy water to collect insects for a more complete inventory of species.

Within education, apart from raising awareness on the importance of pollinators for healthy ecosystems and the challenges that they face, the project aspires to teach participating students to think logically and creatively, and to develop new skills such as data management and sharing information through the web.

For more information: https://www.discoverlife.org/bee/index.html

2. Bees 'n Beans

Bees and Beans was a UK-wide citizen science project designed to map the activity of wild bees in gardens and allotments, with the ultimate goal of informing conservation work. The experiment, in which the participants were required to grow three broad bean plants in pots, enabled the researchers coordinating the citizen science project to compare yields of beans across the UK, revealing differences in pollinator activities throughout the entire country. Once grown, one plant was left for insects to pollinate, the second was hand-pollinated and the third was wrapped in garden fleece or netting. The number of beans produced by the first plant was subsequently compared to that of the second (maximum pollination) and the third (minimum pollination) in order to reveal the activity of insect pollinators.

For more information: https://www.ljbees.org.uk/getting_involved/

3. Hoverfly Lagoons

This UK-based project focuses on hoverflies ("Diptera") - an often overlooked, yet important family of pollinating insects. There are more than 280 hoverfly species in the UK, and Hoverfly Lagoons focuses on those that have an aquatic life stage, with larvae that live in pools of water or 'rot holes' in trees. Participants are encouraged to set up small lagoons in their gardens, using discarded milk bottles and fallen leaves, and then count larvae and collect pupae on a monthly basis. The goal is to work out what are the best ways to make these lagoons, which could act as an artificial habitat supporting the populations of these important pollinators.

For more information: https://www.thebuzzclub.uk/hoverfly-lagoons

4. Air Bee & Bee

"Air Bee & Bee" is a Buzz Club project aimed at creating and testing different types of solitary bee hotels across the UK, looking at what makes the best experience for the bees, other invertebrates and their human hoteliers. Solitary bees are important pollinators, and unlike their better known social relatives (honeybees and bumblebees) which live in colonies, they nest either below the ground or in cavities in old plant stems. Bee hotels are on the one hand a great way to provide certain bees with nesting habitat, but on the other hand they attract

also other garden invertebrates, such as earwigs and spiders. The participants of this citizen science provide to the researchers important information on all organisms calling the bee hotel their home.

For more information: https://www.thebuzzclub.uk/air-bee-n-bee

5. BeeWalk

BeeWalk is a standardised bumblebee-monitoring scheme in the UK, in which volunteer "BeeWalkers" walk the same fixed route (transect) once a month between March and October, counting the bumblebees seen and identifying them to species and caste (queen, worker, male) where possible.

The aims of the scheme are the collection of abundance and distribution data on the UK's bumblebees, and the use of these collected data in order to analyse population trends and carry out other research. The information collected by BeeWalk volunteers is integral to monitoring how bumblebee populations change through time, and allows the involved researchers to detect early warning signs of population declines. All data collected will contribute to important long-term monitoring of bumblebee population changes in response to changes in land-use and climate change and, ultimately, to informing how we manage the countryside.

For more information: https://www.bumblebeeconservation.org/beewalk/

6. BEL-landschap project

BEL-landschap (BEL: Biodiversiteit, Ecosysteemdiensten, Landbouw; Dutch for Biodiversity, Ecosystem Services, Agriculture) is a citizen science project which aims to bring members of local communities together, raise their awareness about the links between agriculture, ecosystem services and biodiversity, and generate knowledge in a collective fashion.

It comprises a network of 40 measuring points scattered across a landscape complexity gradient in a peri-urban landscape in East Flanders, Belgium, collectively known as a "Landscape Observatory". Each measurement point is a standardised 1 m^2 garden containing 10 different crop plants (various vegetables and strawberries). The objective of this "Landscape Observatory" is to assess the influence of landscape complexity on the delivery of various ecosystem services, such as pollination, natural pest control, food production and microclimate regulation.

Figure 5. A 1 m² garden of the BEL-landschap project

The participating local citizen scientists adopt such a garden and commit to take care of it and collect on a weekly basis information on various ecosystem service indicators. These include: abiotic parameters such as soil temperature and moisture, weed infestation, the presence and diversity of pollinators, natural enemies, and pest insects, as well the growth, health and development of the crop plants.

The measurements of the citizen scientists are then collated and analysed by the scientific coordinator of the project, helping him to investigate the relationship between landscape complexity, functional biodiversity and ecosystem services. The final results are shared and discussed not only with the participating citizen scientists but also with various local stakeholders, so that they can become aware of the above relationship, as well as of the impact they have on the landscape.

For more information (available only in Dutch): https://www.bel-landschap.be/

7. Big Butterfly Count

The Big Butterfly Count is a UK-wide survey run by the Butterfly Conservation, aimed at helping researchers and conservationists to identify and act to protect some of the most vulnerable butterfly and day-flying moth species due to the ongoing effects of climate change, habitat fragmentation and agricultural intensification. Butterflies are excellent biodiversity indicators because they react very quickly to changes in their environment, and a decline in their diversity and abundance can be an early warning for the decline of other organisms.

The survey participants are invited to spend 15-minutes recording the butterflies that they see in a selected location (ranging from parks, school grounds and gardens, to agricultural fields and forests) and submit their records afterwards. The collected data are collated and analysed, allowing the scientists and conservationists to track trends in butterfly populations, ultimately informing conservation efforts.

For more information: https://www.bigbutterflycount.org/about

8. Big Farmland Bird Count

This UK-wide citizen science project coordinated by the Game and Wildlife Conservation Fund, involves volunteer farmers, land managers and gamekeepers in the recording of the effects of

the conservation work that they undertake on their land in order to reverse the undisputed decline of farmland bird populations. Conservation actions to that direction include supplementary feeding of the birds during the winter and growing crops specifically to provide food for seed-feeding birds. The participants are invited to spend 30 minutes spotting species on their patch of land during a specified time period in February. The results of the count will aid the researchers and conservation associations to determine which farmland birds are benefiting from conservation efforts and identify those that need extra support.

For more information: https://www.bfbc.org.uk/

9. Invrivi. Insecten vriend of vijand?

INVRIVI is a citizen science project in Flanders, Belgium, in which citizens and pupils, under the expert guidance of professional scientists, collect data in the context of natural pest control of aphids. This extensive collection of data will enable researchers to map which tree species and/or cultivars are susceptible to the pest and which are not. Furthermore, the project wants to make citizens and pupils aware of the many services that insects provide to the society, but also lead to a growing appreciation for science, research and technology, through an active participation to this citizen science initiative.

For more information (available only in Dutch): https://www.hogent.be/projecten/invrivi/

10. Observatoire agricole de la biodiversité (OAB)

Around France, the Agricultural Observatory of Biodiversity (as "Observatoire agricole de la biodiversité" is translated in English) supports volunteer farmers in monitoring the biodiversity of their farms. More specifically, by following established scientific protocols, the farmers monitor the diversity and abundance of: i) earthworms, ii) butterflies, iii) solitary bees, and iv) terrestrial invertebrates. The gathered data feed subsequently a national database, which enables researchers to trace the trends in the evolution of the populations of the observed biodiversity elements. In addition to its scientific objective, the Observatory is also active in raising awareness and providing support to a wide range of actors that play a role in the management of the biodiversity of the agricultural landscapes.

For more info (available only in French):

https://agriculture.gouv.fr/lobservatoire-agricole-de-la-biodiversite-oab-developpement-reussi-de-lobservation-de-la

http://www.vigienature.fr/fr/agriculteurs

11. OPAL Biodiversity survey

The OPAL Biodiversity Survey involves citizen scientists in England in order to help uncover the rich biodiversity of hedges. The participants, by collecting and submitting information on the type of a selected hedgerow and the biodiversity it hosts, help researchers learn more about the importance of hedges for wildlife and humans.

For more information: https://www.opalexplorenature.org/BiodiversitySurvey

12. OPAL Soil and earthworm survey

In the OPAL Soil and Earthworm Survey, the main objective was to develop a method to identify areas of soil degradation through data on soil conditions and earthworms collected by citizen scientists (general public and pupils). Earthworms play a vital role in the recycling of plant nutrients and the aeration of soils, and therefore constitute a widely used indicator of good soil quality.

For more information: https://www.opalexplorenature.org/soilsurvey

13. OPAL X-Polli:Nation project

The X-Polli:Nation project aims to raise awareness about the plight of pollinators, by encouraging participants to collect data on their whereabouts, to plant habitat for these vital insects and by supporting young people to campaign for their protection. Supported by the National Geographic Society, the project provides resources to participants in order to:

- Improve their identification skills by using the XPolli digital butterfly and bee training tool
- Record the pollinators visiting a selected patch before and after making positive habitat improvements, using the X-Polli:Nation Survey Booklet
- Create habitat for pollinators using the species-specific Planting for Pollinators digital guide
- Make a pledge to set aside 1x1m for pollinators through the Pollinator Promise campaign and receive advice on how best to spread the word to encourage their local community to help protect pollinators.

For more information: https://www.opalexplorenature.org/xpollination

14. Participatory monitoring Hoeksche Waard

In Hoeksche Waard, the Netherlands, there is a long-standing tradition in facilitating natural pest control by means of introducing and maintaining flower strips at the field margins.

A wide network of organisations and individuals has been set up in order to facilitate the integration of natural pest control into the farming operations of the local farmers. Volunteers from the workgroup "Butterflies and Dragonflies" of the local landscape association Hoekschewaards Landschap (http://www.hwl.nl/#!abouthwl), monitor three times a years the diversity of bees, hoverflies, butterflies, natural enemies and birds of the flower strips, after having followed a training session on the identification of the concerned organisms. Scientists from the University of Amsterdam research the composition of the vegetation of the flower strips while staff of the "Field crops" research unit of the Wageningen University & Research inspect the fields to assess the presence and abundance of plague insects (e.g. aphids) and their natural enemies. Finally, a local coordinator integrates the information collected by the three different sources and communicates on a biweekly basis to the farmers whether the natural pest control is adequate or whether pesticides should be used to reinforce the work of the natural enemies.

For more information (available only in Dutch):
https://www.naturetoday.com/intl/nl/naturereports/message/?msg=25023

http://www.hwl.nl/#!workgroupspage/i1599/werkgroep-vlinders-en-libellen.html

15. Polycultures and Pollinators

Polycultures and Pollinators, a citizen science project run in the framework of CSI: Bees (Citizen Science Initiative for Bees), aimed to assess whether plant diversity increases pollinator diversity and function. During the project, 40 citizen scientists evaluated bee diversity and pollination services on diversified compared with low-diversity organic farms in western Washington, USA, making use of non-destructive trapping and sentinel plants. The results of the project will provide insight into whether farmers can directly increase pollination services provided by wild bees by diversifying the crops grown on their farms.

For more information: https://nwpollinators.org/citizen-science-2/

16. Tea Bag Index project

The Tea Bag Index project is being conducted by scientists and citizen scientists worldwide. Through the determination of decomposition rates in different soils with the Tea Bag Index method, citizen scientists can help the scientists to understand the global CO_2 cycle better.

The method consists of burying tea bags with Green tea and Rooibos in the soil, digging them up three months later and weighting them.The weight loss indicates how much plant material, in this case tea, has decomposed. This simple and cost-effective method for determining decomposition rates in soil is scientifically proven and several scientific initiatives have already been started in many countries around the globe. These experiments gather comparable data worldwide, so that comparisons between different regions and soils can be made possible.

For more information: http://www.teatime4science.org/

17. The Great Sunflower Project

The Great Sunflower Project has three citizen science programs:

1. The Safe Gardens for Pollinators program, where participants plant a Lemon Queen variety sunflower and then by submitting data on the visiting pollinators, help the scientists examine the effects of pesticides on pollinators.
2. The Pollinator Friendly Plants program which is designed to identify the key plants to support healthy pollinator communities.
3. The Great Pollinator Habitat Challenge, where citizen scientists are given the opportunity to evaluate and improve gardens, parks and other green spaces for pollinators.

For more information: https://www.greatsunflower.org/

3.2.4 Inventory of indicators suitable/with potential for Citizen Science

Table 2. Indicators suitable for Citizen Science

Monitoring topic	Indicators suitable for Citizen Science
Soil quality	Earthworms (diversity/abundance)
Pests & diseases	Pest species (diversity/abundance): e.g. aphids, slugs, etc. Natural enemies (diversity/abundance): e.g. ladybugs, carabid beetles, insect-eating birds
Pollination	Pollinating insects (diversity/abundance): e.g. solitary bees, bumblebees, butterflies, moths, hoverflies
Water quality & conservation	-

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