What is Nature Citizen Science?

Good practices to increase our project quality

Citizen science for nature conservation, (not) on my land

LIFE ENPLC

26 Octubre 2022

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Science for Change

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What is Citizen Science

Citizen science is *"**the participation of the general public in scientific research activities, when citizenship actively contributes to science, whether through its surrounding intellectual effort or knowledge or through its tools and resources***".

In a participatory process developed with members of the CICCNA, minimum requirements were established for a project to be considered nature-citizen science in Catalonia, based on the **10 principles of citizen science** and the characteristics of citizen science.

Haklay, M., et al. (2020) "ECSA's characteristics of citizen science."

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10 principles of CS (ECSA)

1. Citizen science projects **actively involve citizens** in scientific endeavour that **generates new knowledge** or understanding. Citizens may act as contributors, collaborators, or as project leader and have a meaningful role in the project.

2. Citizen science projects have a genuine **science outcome**.

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

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

5. Citizen scientists **receive feedback** from the project.

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10 principles of CS (ECSA)

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

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

8. **Citizen scientists are acknowledged** in project results and publications.

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

10. The leaders of citizen science projects take into consideration **legal and ethical issues** surrounding copyright, intellectual property, data sharing agreements, confidentiality, attribution, and the environmental impact of any activities.

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Minimum Requirements for N-CS in Catalonia

1- Active participation of citizenship

2- A will to improve existing scientific knowledge

3- A will to use scientific methodology

4- Willing to generate a benefit to participants and professionals scientists

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Minimum Requirements for N-CS in Catalonia

5- Will to do Scientific Publication of Research Results

6- Information to participants of internal questions of the project

7- Feedback to participants

8- Will to open data whenever possible

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Minimum Requirements for N-CS in Catalonia

9 - Recognizing the citizens in the results publications and project posts

10-Will to ensure data quality

11- Will to evaluate experience of participants

12- Will to generate social impact through project

13- Implement ethical code

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Why is CS important **NOW** in Nature conservation

CS-Nature is the most advanced field in CS, with the higher impact and the longest story.

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Benefits of CS

- Alignment of scientific and social agendas and needs
- Allows us to generate new data sets
- It covers all scientific disciplines, including social sciences
- It has great potential to report better public policies
- Promote awareness and behavior changes
- It has great educational potential and encourages critical thinking
- It has great communication potential and contributes to the fight against disinformation

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Scientific Aspect

Socio&Educational Aspect

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Citizen science as a valid data generator

- Knowledge flush, granularity, trends
- Complement existing data sets
  Create new datasets
- Compare new data with existing datasets

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Citizen science as a valid data generator

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Biodiversity studies / research:
CS it the largest source of data.

It would be imposible to gather this data without citizens involved
(Chandler et al., 2017)

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Data

Type of data generated by citizenship

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Data

Type of data generated by citizenship

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Data

Type of data generated by citizenship

Includding public and oficial data sets

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Data

Time of generated data

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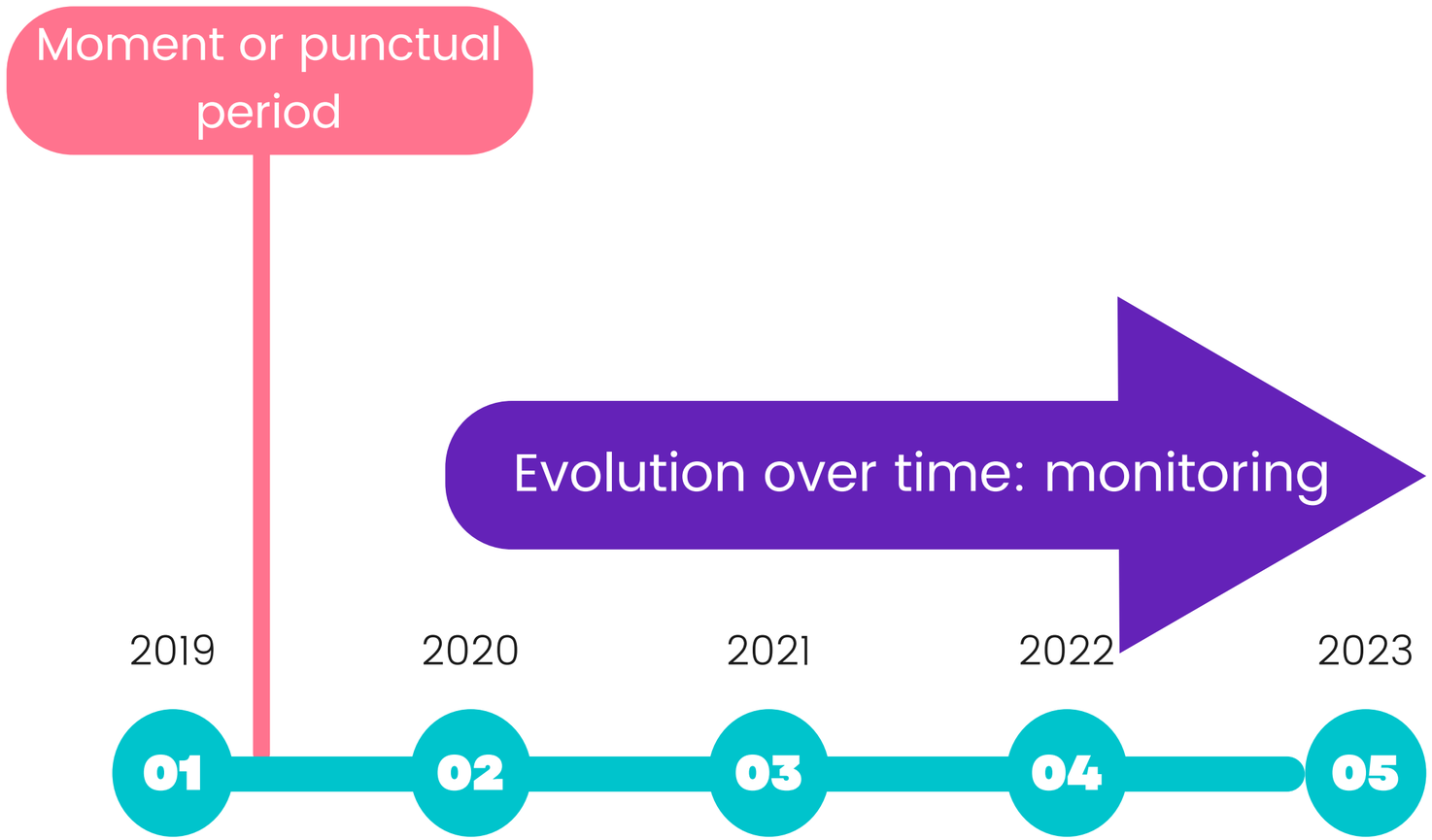
Data

Time of generated data



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Benefits of N-CS for Public Policies

- Enhanced knowledge base;
- Co-design of policies based on evidence and aligned with the needs of society;
- Proactive Focus;
- Social recovery of political measures;
- Acceptance of policy measures;
- More open and transparent decision making;
- More inclusive and participative policies;
- Better value-quality ratio;
- Public policy assessment;
- A more open, informed and responsible society.

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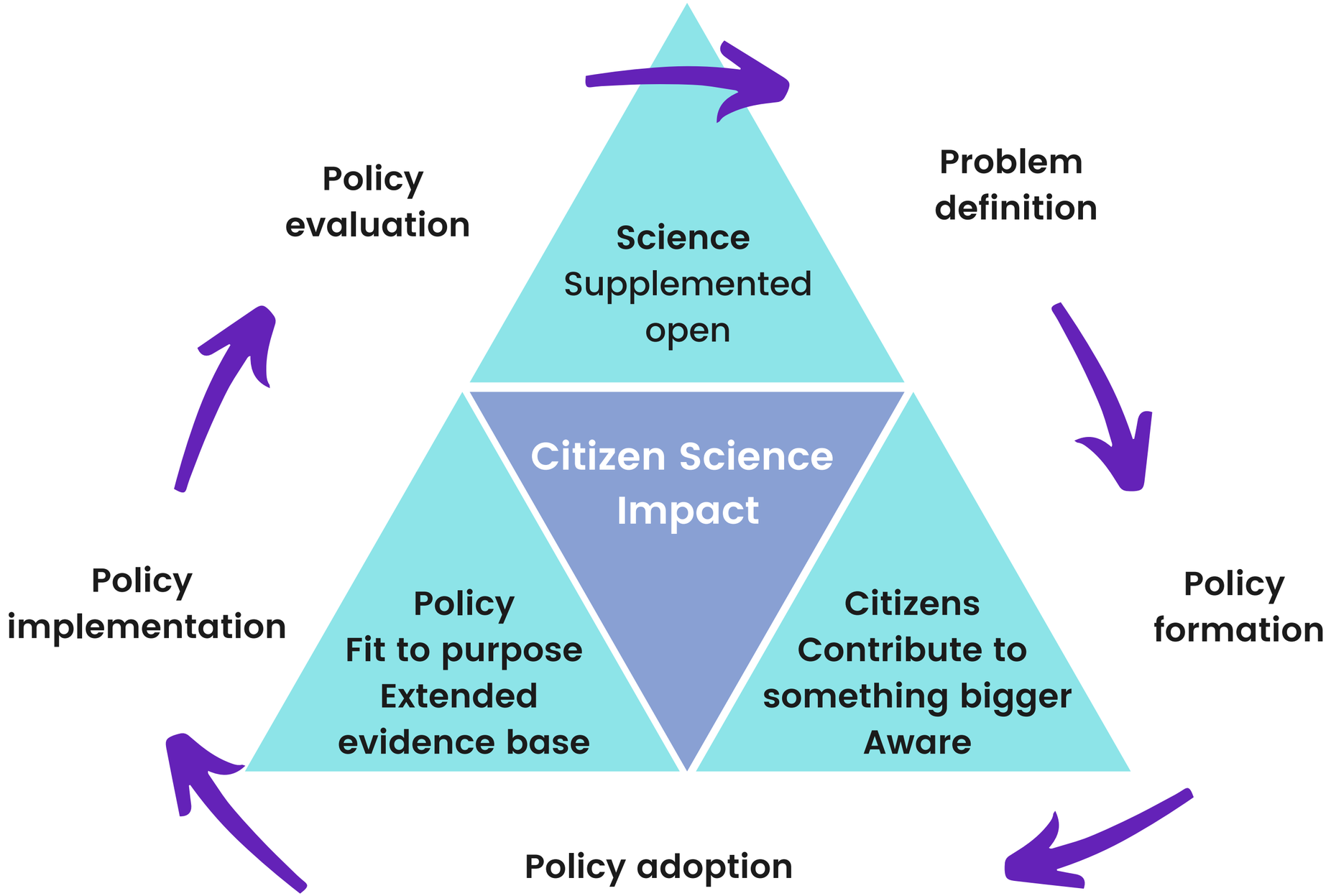
Inventari dàctivitats de la CC per a les polítiques mediambientals, JRC, 2018

Best practices in Citizen Science for Environmental Monitoring, European Commission, 2020

Benefits of N-CS for Public Policies



Best practices in Citizen Science for Enviromental Monitoring, European Comission, 2020. Figure 1

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The N-CS to inform SDG's

- Traditional sources of data are not enough to inform SDG
- N-CS its an example of non traditional data source thats its already contributing
- The 17 goals have at least that is being measured or that can be measured with CS
- 5 of them are being monitored with citizen created data, and can help to measure up to 76 indicators, 33% of all of them

PERSPECTIVE

nature sustainability

Corrected: Author Correction

Citizen science and the United Nations Sustainable Development Goals

Steffen Fritz[1✉], Linda See[1], Tyler Carlson[2], Mordechai (Muki) Haklay[3], Jessie L. Oliver[4,5], Dilek Fraisl[1,6], Rosy Mondardini[7], Martin Brocklehurst[8,9], Lea A. Shanley[10], Sven Schade[11], Uta Wehn[12], Tommaso Abrate[13], Janet Anstee[14,15], Stephan Arnold[16], Matthew Billot[16], Jillian Campbell[16], Jessica Espey[17], Margaret Gold[18], Gerid Hager[1], Shan He[19], Libby Hepburn[5], Angel Hsu[20], Deborah Long[21,22], Joan Masó[23], Ian McCallum[1], Maina Muniafu[22], Inian Moorthy[1], Michael Obersteiner[1], Alison J. Parker[24], Maike Weissplug[25] and Sarah West[26]

Traditional data sources are not sufficient for measuring the United Nations Sustainable Development Goals. New and non-traditional sources of data are required. Citizen science is an emerging example of a non-traditional data source that is already making a contribution. In this Perspective, we present a roadmap that outlines how citizen science can be integrated into the formal Sustainable Development Goals reporting mechanisms. Success will require leadership from the United Nations, innovation from National Statistical Offices and focus from the citizen-science community to identify the indicators for which citizen science can make a real contribution.

Fig. 2 | Traditional and non-traditional data sources available for SDG monitoring and implementation. Traditional and non-traditional data sources are shown in black and blue, respectively.

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THE CATALAN EXAMPLE

Map of the major biodiversity platforms, collections and databases in Catalonia

CITIZEN SCIENCE PLATFORMS

BIODIVERSIDAD VIRTUAL
Organised in 12 themed galleries of geolocated digital photographs that make up a taxonomically ordered database.
Institution: Asociación Fotografía y Biodiversidad.
Year stablished: 2010
Observations: 1.000.000

ORNITHO
A portal dedicated to exchanging information on observations of birds, mammals, amphibians, reptiles, dragonflies, diurnal butterflies and cicadidae in Catalonia.
Institution: Catalan Institute of Ornithology.
Year stablished: 1996
Observations: 4.159.087 (97% are birds)

NATUSFERA
A platform for monitoring biodiversity in general. It uses photographs and shares information between users.
Institution: CREAF, CSIC and GBIF.
Year stablished: 2016
Observations: 14.070

- RESEARCH CENTRES
- UNIVERSITIES
- MUSEUMS
- CITIZEN SCIENCE AND VOLUNTARY WORK
- THIRD SECTOR ORGANISATIONS
- LOCAL, AUTONOMOUS COMMUNITY AND SPANISH GOVERNMENT BODIES
- NATURALISTS
- COMPANIES

COLLECTIONS

COLLECTION OF THE BARCELONA MUSEUM OF NATURAL SCIENCES
Collections of specimens of plants, lichens, fungi, animals, sounds, fossils, minerals and rocks.
Institution: Museum of Natural Sciences.
Year stablished: 18th century
Exemplars: 3.994.411

HERBARI BCN
Plant groups: algae, bryophytes, cormophytes, fungi and lichens. Fruits, seeds and ethnobotany.
Institution: University of Barcelona.
Year stablished: 1920
Exemplars: 400.000

DATABASES

BIODIVERSITY DATABANKS (BIOCAT)
Compiles biodiversity in Catalonia as regards: arthropods, bryophytes, flora and vegetation, fungi, invertebrates, lichens, vertebrates and genetic diversity in plants.
Institution: University of Barcelona.
Year stablished: 1998
Records: 2.498.141

GLOBAL BIODIVERSITY INFORMATION FACILITY (GBIF)
An inter-governmental organisation of 53 countries and 43 international organisations. It compiles data on all species in all kingdoms.
Institution: In Spain, this is the Spanish National Research Council (CSIC).
Year stablished: 2001
Records: 23.243.131

BANCO DE DATOS DE LA NATURALEZA
A Spanish inventory of terrestrial species, habitats and themed maps of the natural environment, creating an integrated system of information on the natural heritage.
Institution: MAPAMA
Year stablished: 2011

Sources: Map of Research and Environmental Innovation Actors in Catalonia. Map of research units in Catalonia: recognised research groups, research centres (CERCA and CSIC) and technology centres (TECNIO). 2017. MTS, Government of Catalonia

Acronyms: CSIC - Consejo Superior de Investigaciones Científicas (Spanish National Research Council); MAPAMA - Ministry of Agriculture, Fisheries, Food and the Environment; CREAF - Ecological and Forestry Applications Research Centre

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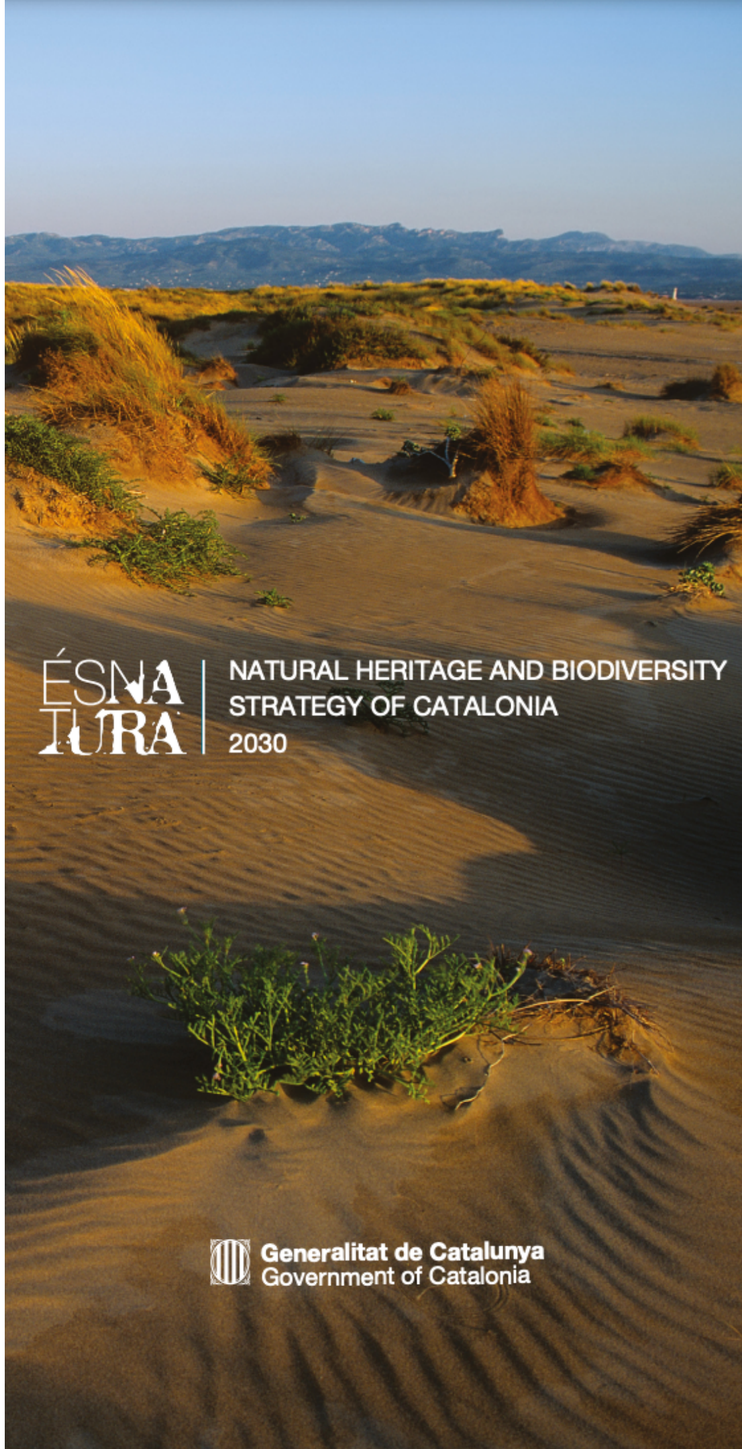

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"Most of the data come from citizens' science projects, with the participation of coordinated networks of hundreds of mainly volunteer naturalists, linked to key institutions in each biological group."

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THE CATALAN EXAMPLE

Department of Climate Action, Food and Rural Agenda

- CICCNA - 14 member organizations (Comission for the Impulse of Citizen Science and Nature)
- Virtual display, Diagnosis and Best Practices Manual
- Natural heritage and biodiversity Observatory of Catalonia - space of stable collaboration between research institutions in the field of nature and political decision-making, with a strong stake in citizen science

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Awarness and behavioural change

- Increase awareness (above all the deeper participation)
- It encourages co-responsibility in matters that affect us all
- Can promote **behaviour and action** changes

By measuring and collecting data, we are more aware of the specific problems we are investigating. And all the agents involved can act to address it.

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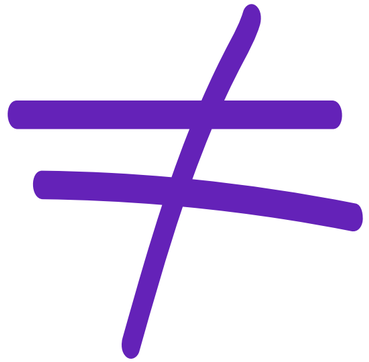
Knowledge
Actitude
Intention



Action

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How CC increases sci-ed

Students act as multipliers toward their families, increasing awareness and participation in CC projects

They can also act as communicators/scientists/who creating their own materials (videos for social media, scientific posters, etc.) or through mouth-to-mouth

It is a key tool for facilitating dialogue between researchers and students and for breaking gender stereotypes in the field of scientific research

Allow students to discover at first hand a wide range of search modalities

Schools

Museums - Art

Libraries - intergenarational

Parks - Field work

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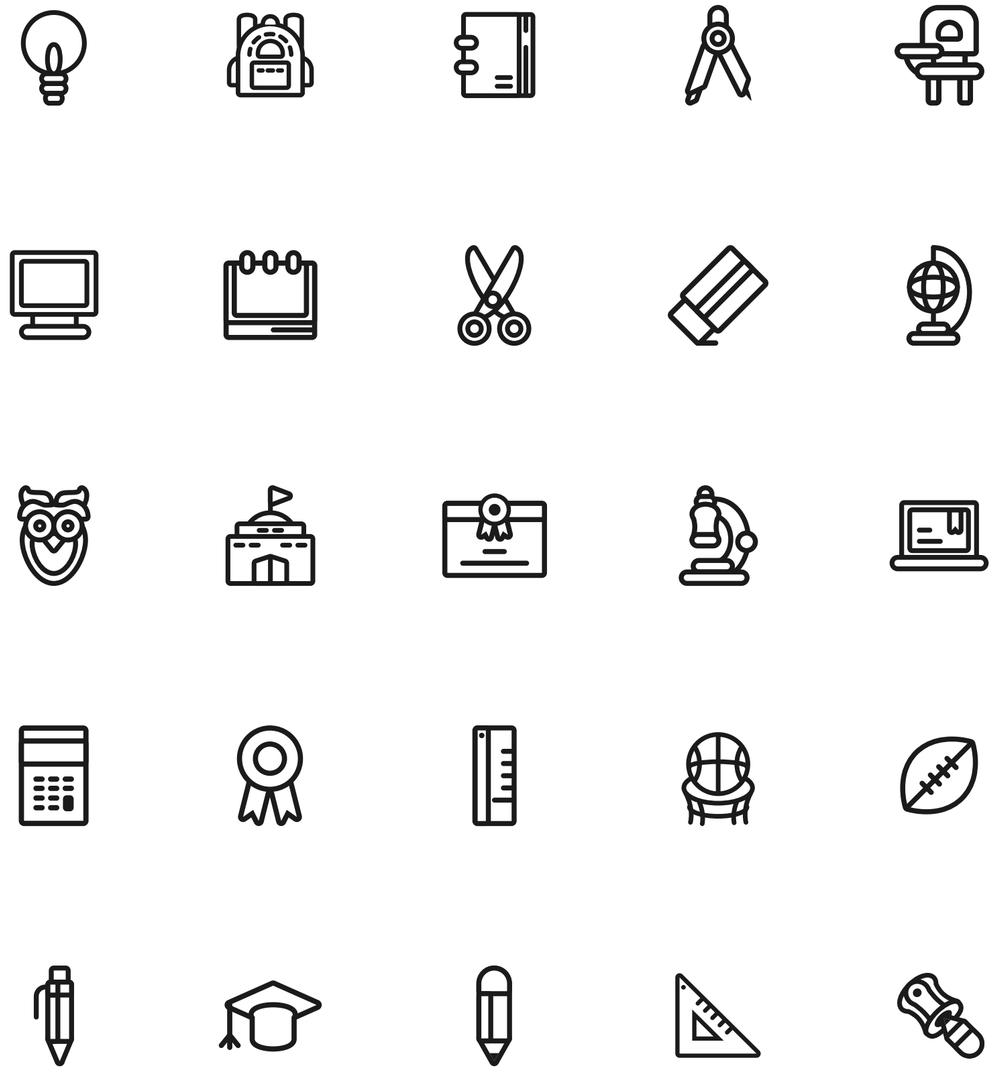
Promotes STEAM vocations and interdisciplinar work

Citizen science actively engages students in research, helping to encourage STEAM calling, especially if scientists act as referents, breaking gender stereotypes



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Promoting a thoughtful and responsible youngster

Critical thinking	Creative thinking	Curious thinking
Promoted by logic, observation and analysis	Incentive imagination and the ability to think of new possibilities to solve problems	Derived from the ethics of care. It is indispensable in a community as it places people at the centre and promotes **empathy**

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Promoting a thoughtful and responsible youngster

Critical thinking

Scientific method exploration

Data Analysis

Collaboration of consistent conclusions from previously collected scientific data

Creative thinking

Contribute new solutions to address environmental, social, or health issues being investigated

Curious thinking

Explore links between the issues being investigated and community welfare

Reflection on socio-environmental impacts of the problem under investigation

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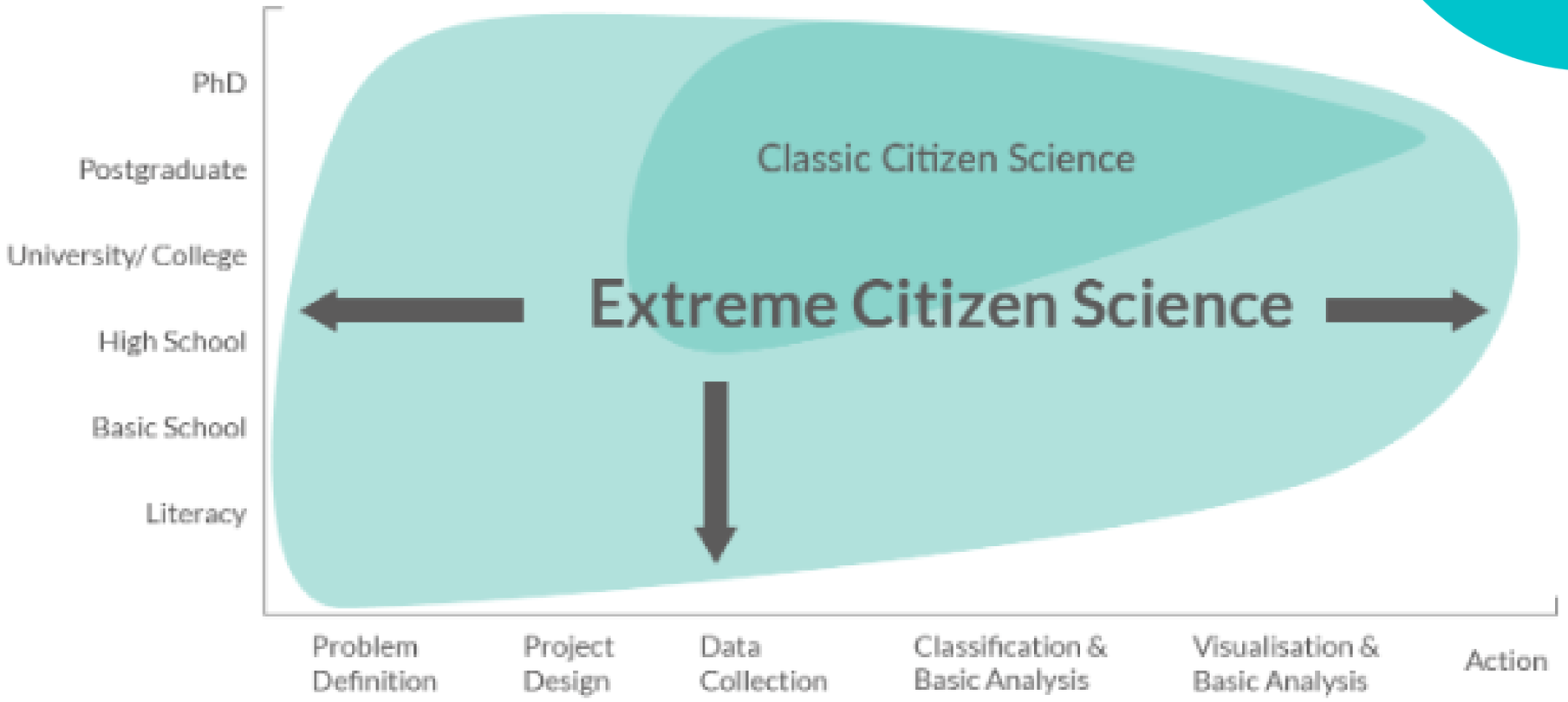
Citizen science projects are not easy



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Manual of Best Practices for N-CS

Participation

Participation design
Involvement strategy
Consolidation of participation over time
Development of a long-term
Training/capacity plan
Return to participants

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Manual of Best Practices for N-CS

Participation

Socio-educational aspects

IIncreased citizenship knowledge in science and the environment
Change the attitude of participants to the environment
Gender Perspective Integration
Integration of under-represented groups
Promoting Community Links
Social impact assessment
Establishing consolidated links with formal and non-formal education centres
Performing educational activities aimed at different audiences

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Manual of Best Practices for N-CS

Participation

Socio-educational aspects

Scientific and OpenData aspects

Using a correct scientific methodology
Representation of collected data
Quality of required data and protocols
Communication of results through scientific articles
Opening data according to FAIR principles

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Manual of Best Practices for N-CS

- **Participation**
- **Socio-educational aspects**
- **Scientific and OpenData aspects**
- **Ethical and legal aspects**

Share clear and understandable information about the project to participants
Voluntary expression of informed consent
Follow-up of the General Data Protection Regulation (GDPR)
Intellectual Property Recognition
Set ethical appropriate code

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Where to look for...

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European Proyects

eu-citizen.science

240 Projects
197 Resources
64 Curses
218 Organizations

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Help to develop and/or design

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Want to know more?

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