Citizen Science Approaches Methods and Typologies Reference

A guide to choosing and describing a project

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Citizen science involves members of the public in research that produces new knowledge or understanding. Participation can include setting questions, gathering observations, analysing evidence and discussing findings. The responsibilities and benefits should be clear. Use this directory to describe your choices, rather than collecting labels. The Noresund examples are hypothetical. (ECSA, 2015)

Use these terms carefully

Term	Meaning and a design example
Approach or lens	A broad way of framing the question. A geographical lens asks where observations vary; an ecojustice lens asks who experiences harm or has influence.
Methodology or research design	The rationale and organisation of the inquiry: why these methods can answer this question. A case study can examine one bounded place; mixed methods can connect counts with interviews.
Method	A specific way to generate or analyse evidence, such as a standardised count, interview, water measurement or thematic analysis.
Tool	An instrument or aid used within a method, such as a sensor, paper log, mobile app, map or coding program.
Framework	A structure for planning, interpreting or evaluating a project, such as a logic model or Theory of Change.
Typology	A classification that groups projects by a stated axis. Shirk, Haklay and Wiggins and Crowston classify different features and should be named separately.

A quick way to choose

Start with a useful question and the people it affects. Choose the research design and methods that could answer it. Agree participation and decision rights. Then choose tools, quality checks, access arrangements and feedback. A particular app, a large dataset or a co-created label does not by itself establish sound research or inclusion.

The next pages retain the range of ideas in the original handout while separating disciplinary lenses, research methods, participation typologies and other analytical tools. Some entries are general research or social theory concepts, not established citizen science typologies.

Lenses for framing a project

These lenses can be combined when the question needs them. They are not competing ranks, and they do not substitute for a research design.

Lens	What it helps you ask in the Noresund exercise
Geography	Where are observations, people and activities located? Use maps to examine access, land use and spatial variation.
Natural sciences	What can systematic observations, measurements or experiments establish about the environment? Choose a suitable sampling plan.
Humanities	How do people interpret places, practices and environmental change? Consider oral histories, texts and cultural records with appropriate permissions.
Landscape ecology	How might patterns and processes across farmland, forest and tourism areas relate? Match the spatial scale to the question.
Ecojustice philosophy	Who experiences environmental burdens or benefits, and whose priorities influence decisions? Treat distribution and power as research questions.
Transdisciplinarity	How can academic, professional and local knowledge help frame and investigate a shared problem? Agree how disagreements and different evidence standards will be handled.
Sociology of science	How is knowledge produced, trusted and recognised? Examine whose observations receive attention and credit.
Intersectional and feminist perspectives	How do overlapping social positions and power affect access, risks and recognition? Ask people about their circumstances rather than predicting views from identity.

Evidence orientation and project leadership

Qualitative research explores accounts, meanings and processes; quantitative research works with measured or counted patterns. Mixed methods deliberately connect both. Bottom-up and top-down describe where initiation and control sit, often in combination; neither label alone shows whether participation is fair or evidence is credible.

Crenshaw's (1989) Black feminist analysis showed how treating race and sex as separate categories obscured Black women's discrimination. McCall (2005) distinguishes anti-, intra- and intercategorical approaches to studying categories and inequalities. These are not participation levels. In this exercise, ask whose experiences disappear within a broad label such as residents. Paleco et al. (2021) and Tengö et al. (2014) offer related guidance on inclusion and knowledge partnerships.

Research designs methods and tools

Choose methods for the question, the setting and the people who will use them. A short classroom discussion designs a possible study; it does not complete an empirical case study or an ethnography.

Design or method	Purpose and a practical limit
Case study	An in-depth investigation of a bounded case using relevant evidence. Define the place, period and sources; a single case does not automatically represent other settlements.
Ethnography	Sustained study of practices and relationships in context, often using observation and interviews. A one-off workshop is not enough to claim ethnographic understanding.
Phenomenology	An inquiry into how people experience a phenomenon. It has its own philosophical and analytical commitments and is not a synonym for any interview.
Focus groups and interviews	Methods for discussing experiences, concerns and interpretations. Account for consent, confidentiality, facilitation and unequal speaking time.
Field surveys and repeated observations	Counts or records made using a defined protocol. Specify sites, timing, effort and non-detections; an unobserved species is not necessarily absent.
Mapping photographs sensors and logs	Tools or recording techniques. Explain what is measured, the calibration or location accuracy needed, and how records will be checked.
Content narrative and thematic analysis	Related but distinct ways to examine texts, stories or other qualitative records. State the analytical question, coding process and interpretation checks.
Statistics and GIS	Analysis methods and software for numerical or spatial questions. Match the model and map to the sample and its limitations.
Quality assurance and quality control	Plan clear instructions, training, practice, validation and error handling before collection, then check records. A protocol supports credibility; it does not guarantee a fixed accuracy rate.

Planning and evaluation frameworks

SWOT organises strengths, weaknesses, opportunities and threats; it is a planning tool. A logic model connects inputs, activities, outputs and outcomes. A Theory of Change explains the proposed pathway, assumptions and external conditions linking action to change. Return on investment is an evaluation lens that needs defined costs, benefits and a timeframe; social or ecological value cannot always be reduced to money.

Monitoring may inform a later decision, but a Theory of Change does not prove that data will change policy. Record who could act, what additional evidence they need and what lies outside the project's control. (Tweddle et al., 2012; Freitag et al., 2016)

Three different citizen science typologies

Name the framework and its axis. These systems help describe a project. They are not one combined ladder, and none makes co-created or extreme participation compulsory.

Five models from Shirk and colleagues

Shirk et al. (2012) describe models of public participation in scientific research. Responsibilities may vary across stages; describe the real arrangement as well as the label.

Model	Main participation arrangement
Contractual	Communities ask professional researchers to undertake a particular investigation and report results.
Contributory	Professional researchers generally design the project; members of the public primarily contribute data.
Collaborative	Public participants contribute data and also help refine design, analyse evidence or disseminate findings.
Co-created	Professional researchers and public participants jointly design the project; at least some public participants engage in most or all stages.
Collegial	Non-credentialed individuals conduct research independently, with varying recognition from institutional science.

Four participation levels from Haklay

Haklay (2013) discusses participation in citizen science and volunteered geographic information. These levels describe work and influence in a project, not a participant's intelligence or worth.

Level	Participation described
1 Crowdsourcing	Participants contribute observations or sensing capacity within a task largely defined elsewhere.
2 Distributed intelligence	Participants contribute interpretation, classification or problem-solving effort.
3 Participatory science	Participants help define the problem and contribute data.
4 Extreme citizen science	Participants and researchers can collaborate across problem definition, data collection and analysis.

Five project types from Wiggins and Crowston

Wiggins and Crowston (2011) distinguish action, conservation, investigation, virtual and education projects through project goals and organisational features, including physical or virtual work. This is a different classification from decision-making participation. A project can have mixed goals; an online component alone does not settle its type.

Other lenses and classifications

The original handout also includes the following ideas. Use them for the stated purpose and avoid presenting them as interchangeable citizen science typologies.

Idea	What it can help examine and what to avoid
Arnstein's ladder	A 1969 account of power in citizen participation: manipulation and therapy; informing, consultation and placation; partnership, delegated power and citizen control. It can prompt questions about influence. It is not a scientific-method ladder or proof that every project must end in citizen control.
Outcome-oriented classification	A way of grouping projects by intended or observed results. State the outcome framework you use. Outputs such as records or meetings differ from outcomes such as learning or an adopted practice; do not assume impact from participation alone.
Booth's listening rhetoric	A broader rhetorical lens on listening and persuasion, rather than a citizen science typology. Booth discusses rhetorology and critiques manipulative rhetoric, including rhetrickery. Use the lens to reflect on communication, not diagnose participants. (Booth, 2004)
Kellert and nature values	People may describe scientific, practical, aesthetic or moral relationships with nature. These can be discussion prompts; they are not a verified complete taxonomy here. Do not assign values to farmers, tourists or researchers based on occupation. (Kellert and Wilson, Eds., 1993)
Citizen humanities tasks	Transcribing, tagging, categorising, mapping, translating and interpreting cultural material describe fields or tasks. Storytelling and oral history can contribute evidence when supported by a suitable method and permissions. Task names alone do not specify participation rights. (Heinisch et al., 2021)
General and specific guidelines	A distinction between broad principles and instructions for a particular protocol. It is guidance design, not a participation model. Provide both where needed.
Latent class analysis	A statistical method for estimating unobserved classes from response patterns under a model. Classes depend on variables and assumptions; they are not natural stakeholder groups or proof of fixed community identities. It is not a citizen science typology. (Collins and Lanza, 2010)

Check your choice

Can you say what the concept classifies or explains, why it is useful here and what evidence would support the claim? If a label does not change the design or interpretation, leave it out. In the Noresund exercise, prioritise a useful question, feasible methods, explicit decision rights and honest limits.

References

These readings support the definitions and distinctions in this directory. They do not verify the hypothetical Noresund scenario. URLs are included for further reading.

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My choices and questions