



POLICY BRIEF

ON ENVIRONMENTAL JUSTICE

Citizen Social Science for Sanitation Policy in the Matanza-Riachuelo Basin

DOI: 10.5281/zenodo.7249193

Cite as: Actis, Guillermina, Arza, Valeria, Cané, Santiago. (2022). Citizen Social Science for Sanitation Policy in the Matanza-Riachuelo Basin. Zenodo.
<https://doi.org/10.5281/zenodo.7249193>



This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.
<https://creativecommons.org/licenses/by-nc-sa/4.0/>

The CoAct project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 873048



Co-Designing Citizen Social Science for collective action



POLICY BRIEF ON ENVIRONMENTAL JUSTICE

Citizen Social Science for Sanitation Policy in the Matanza-Riachuelo Basin

AUTHORS: Actis, Guillermina; Arza, Valeria; Cané, Santiago.

AUTHORS credits: Actis, Guillermina (CENIT/UNSAM): writing original draft, conceptualisation, investigation. Arza, Valeria (CENIT/UNSAM): writing original draft, conceptualisation, investigation. Cane, Santiago (FARN): investigation.



1. Executive Summary	06
2. Introduction	06
3. Rationale for promoting transformative action using Citizen Social Science (CSS) approaches	07
4. Our methods	10
5. Proposed Policy Options.....	11
5.1. Digital information infrastructure for citizen science.....	11
5.2. To articulate CSS with existing policy participatory mechanisms.....	12
5.3. To include CSS as a tool for policy making and implementation.....	12
5.4. To generate CSS data for environmental impact assessment.....	14
5.5. To explore landscape impact assessment and combine it with CSS.....	15
5.6. To promote synergies between environmental education and CSS.....	15
6. Policy recommendations.....	16
7. Transferability to other regions	16
8. Sources.....	17
9. Links to original research	18
Annex A. Participation mandate and open science	19
Annex B. Methodology.....	23
Annex C. Results of Q method analysis.....	33

1. Executive Summary

This policy brief argues about the need to better connect Citizen Social Science (CSS) with Sanitation Policy in the Matanza–Riachuelo Basin. This is justified by both the complexity of the socio–environmental problems at stake, and the participatory mandate of national and international regulation regarding environmental policy. We explored the visions of national, provincial and municipal authorities in the basin regarding benefits and challenges of enhancing links with CSS initiatives. We found optimism regarding the potential of these links, especially in relation to policy responsiveness and community empowerment associated to the participatory nature of CSS. However, we also found several challenges for its actual uptake, which were discussed with policy makers all along the research cycle of the Research and Innovation Action and more in depth during the transformation to action phase. Based on these discussions we co–produced several policy options that are described here together with concrete policy recommendations.

2. Introduction

CoAct understands **Citizen Social Science (CSS)** as participatory research co–designed and directly driven by citizen groups sharing a social concern. CoAct has brought together and further developed methods to give citizen groups an equal ‘seat at the table’ through active participation in research, from the design to the interpretation of the results and their transformation into concrete actions.

Citizens act as Co-Researchers and are recognised as in-the-field competent experts. Multi-stakeholder collaborations have formed **Knowledge Coalitions** to enable the provision of socially-robust scientific knowledge to promote social change.

One of the CoAct Research and Innovation (R&I) Actions took place in Buenos Aires (Argentina) and was focused on environmental justice and, being more specific, on how to use CSS tools to promote transformative actions in three areas: water quality, conservation of natural areas and resettlement or re-urbanisation of people living in areas of high environmental risks. The R&I Action #3 was named “CoAct for Environmental Justice” (CoAct Justicia Ambiental, in Spanish).



Figure 1

Citizen Social Science in Action, with citizen groups, a specific concern, and the support of the Knowledge Coalition.

3. Rationale for promoting transformative action using CSS approaches

Environmental justice is based on a fair treatment, participation and involvement of people affected by environmental issues in the development, implementation and application of environmental laws, regulations and policies (EPA, 2021). In the Matanza-Riachuelo basin (MRB), participation in sanitation policy making is a legal mandate but it does not occur, partly because it is a very complex context.

The basin is affected by a wide diversity of socio-economic and environmental problems, such as housing deficit, water and air contamination, and lack of green areas, all of which causes health problems. In addition, it is a very populated area: around 12% of Argentinean population live there. There are almost 14,000 industries, many of them dumping their waste into the river, while 18% of the population is not connected to the drinking water network. The basin covers the southern part of Buenos Aires City, and it extends to the province of Buenos Aires where it crosses 14 municipalities. This adds to its complexity since the area is ruled by different government jurisdictions (Municipalities, City, Province, and Nation) normally governed by different political parties, which has made it very difficult to advance with comprehensive solutions.

In brief, there are competing interests over land and water uses among different stakeholders, conflicting positions over environmental decisions and asymmetric capacities to influence policy making processes in a context of institutional complexity and severe and long-lasting socio-environmental problems.

In such a complex scenario, knowledge produced by CSS initiatives could contribute towards environmental justice because problems are considered from multiple angles and with the insights of situated experiences. In a CSS approach scientific knowledge production is integrated into pre-existing territorial networks and social practices in flexible arrangements to promote community participation at all stages of the research process. These characteristics (transdisciplinary, participatory, and well embedded in the local context) make CSS a potentially beneficial approach to contribute to the Sanitation Policy in the MRB because of its capacity to deal with complexity, and because it creates opportunities for citizen participation in policy formulation, which is a policy mandate. As it is showed in Figure 2 and explained in Annex A, from the United Nations Rio Declaration to the Escazú Agreement, there are international requests for participation of affected communities in environmental regulations and laws. This is also a mandate included in Argentinean Environment Law and in specific regulations regarding sanitation policy in the basin too.

The R&I Action #3 aimed at promoting CSS to advance transformative actions towards environmental justice, including policy making. The R&I action was organised in five phases over the period of three years. In total, we interacted with 41 policy makers, when building the knowledge coalition, in the platform co-design phase and especially, in the phase of transformation of results into action to create impact.

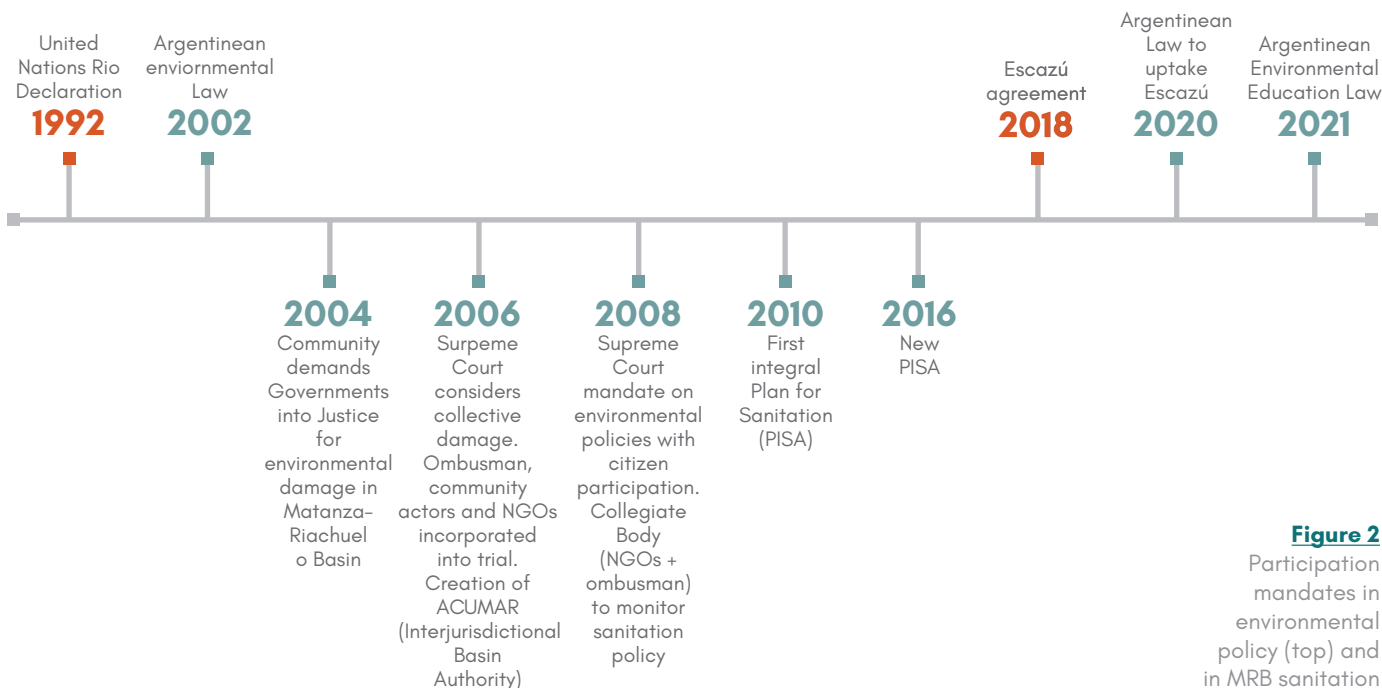


Figure 2
Participation mandates in environmental policy (top) and in MRB sanitation policy (bottom)

Throughout the research cycle we aimed at identifying different pathways for transformation in sanitation policy. We learnt that CSS initiatives could contribute through different channels and mechanisms that are illustrated in Figure 3. We explain below those relevant for policy makers who are keen to be engaged with communities using a CSS approach, organised by types of interactions: knowledge production and action.

From communities' activities to knowledge production:

- CSS tools allow citizens to draw the attention of scientific research to certain understudied topics, or to describe them in a more precise way according to the views of the affected people. CSS helps building bridges between science and society, by allowing citizens to orient research towards the needs of communities.
- CSS can improve the efficiency in the use of resources for research. More data can be produced and analysed in a decentralised way. Citizens can mobilise a large amount of resources to produce knowledge. CSS data usually comes geo-referenced and reaches remote territories that would be very expensive to access otherwise. The time dimension also matters since they are updated and can serve as early warnings.

From knowledge to policy making:

- Knowledge produced with a CSS approach could help to produce relevant insights for evidence-based policy making because it builds from the experience of affected communities. This will drive policy measures to be more rooted in environmental justice principles.

- CSS knowledge could produce renewed and relevant insights for an ongoing policy agenda or could derive in a brand-new policy agenda.

From communities to action:

- Participation in CSS initiatives facilitates learning and behavioral change and therefore contributes to environmental justice actions.
- A mobilised community to generate new knowledge about something that is unknown or only partially known is functional and necessary to promote actions that challenge the status quo.

From actions to policy:

- A mobilised community can advocate for the involvement of others needed for socio-political changes. This can be especially useful in a situation where there are conflicts of interest, as is often the case with environmental policies. Some policy actors, especially those trying to change established practices, may feel attracted to these types of projects. Eg. municipalities

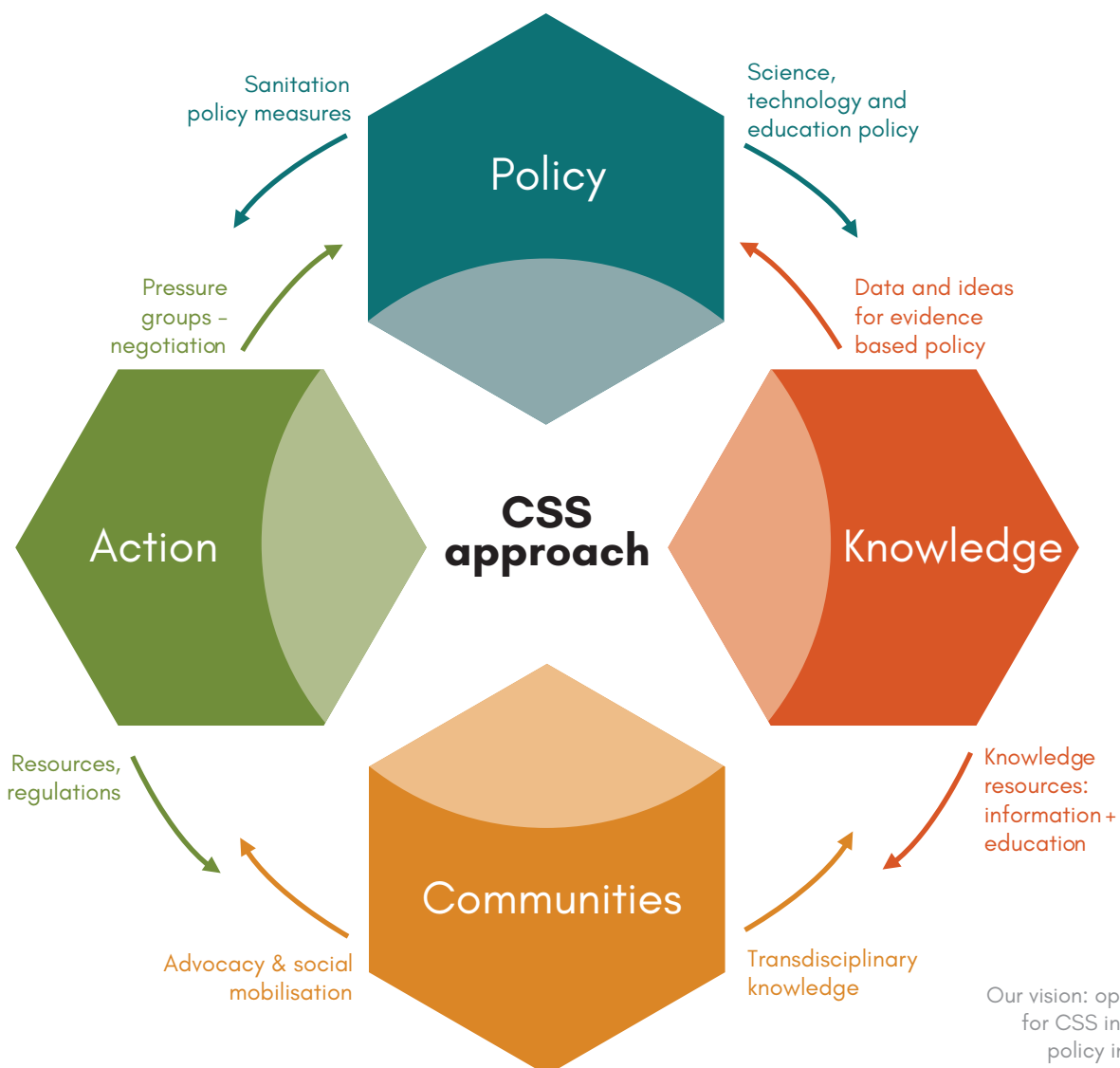


Figure 3
Our vision: opportunities for CSS in sanitation policy in the basin

Note: Arrows in the top-down direction represent sanitation and S&T policies, including regulations and resources. Arrows in the bottom-up directions represent political and knowledge interactions among community and policy.

4. Our methods

In the transformation of results into action phase, we used Q-method to identify policy makers' perspectives regarding the uptake of CSS knowledge in policy design and implementation. With the results of this exercise, we organised a policy workshop to delineate specific policy options to better connect CSS with policy making in sanitation policy. In Annex B we present our methodology more extensively.

Q-method is a research methodology to investigate different perspectives on an issue. In our context, we found two non-confrontational narratives regarding the potential contribution of CSS to policy-making processes.

There is an optimistic general view regarding the potential contribution of CSS to socio-environmental issues, confirming the existence of a window of opportunity to promote this approach. Stakeholders believe that CSS promotes empowerment, inclusion and more responsive policies since they benefit from situated knowledge. The highest valued mechanism explaining optimism in the CSS-policy link is the participatory nature of CSS -rather than the capacity to produce and make available citizen-driven data. This is not surprising in the context under analysis that has participation as a formal mandate for sanitation policy.

Although they have some common background in the way they value participation, the two narratives differ regarding what is the specific contribution to the policy making process that CSS could enhance, or, in other words, in what stages or aspects of policy making there are more prospective links with a CSS approach. One of them (Narrative A) finds the potential mostly related to the initial phase -problem identification- of policy formulation or in changing policy frameworks, while the other perceives that the highest contribution is in the implementation stage. In Annex C we present these results in more detail.

The narratives can be spelled out as follows:

Narrative A

"CSS produces ideas to create new policies or policy programs. These initiatives are particularly useful in the context where there is a lack of policy actions/bodies, to fill a vacant area, thus **complementing** the available policy knowledge. Citizen participation **makes visible** concrete socio-environmental problems".

Narrative B

"**Synergies** can be created between public policy agencies and CSS initiatives, contributing to the improvement of ongoing policymaking processes. Participation increases **trust** in policy actions, which is necessary to enhance policy effectiveness".

The narratives obtained are the entry point to identify policy options because they shed light over different scenarios where CSS initiatives could contribute to decision-making processes. We used an adapted version of a three-horizons (current, ideal and innovation) exercise in a policy workshop (see Annex B) to delineate those options, which are presented below.

5. Proposed Policy Options

There are two main areas of application to promote connections between CSS with policy making. First, by advocating the policy uptake of CSS initiatives within the milieu of Science, Technology and Innovation (STI) policy. Second, by advocating CSS in the application field. In this R&I Action this requires to uptake, promote and create CSS initiatives and their territorial networks among policy makers working in sanitation policy in different areas and jurisdictions (municipalities, provinces and national States). In what follows we list different options and sub-options, the challenge they address, the narrative they relate to, and the specific policy bodies to target.

5.1. Digital information infrastructure for citizen science

CSS projects open opportunities for linking science and society in policy making processes. However, it is necessary to make these initiatives more visible and to showcase their potential. Information and communication technology could contribute on this regard, as it has been the case with other open science practices. Some efforts are already underway that can be catalysed. We list the most needed innovations related to digital infrastructure:

5.1.1. To create a platform of citizen science initiatives that is easily accessible and connected to policymakers needs and/or thematic areas

Centralised information is an important step to promote CSS among policymakers. They need to learn about CSS initiatives that connect with communities' problems. The Ministry of STI has started indexing and publishing project briefs (**MINCYT-PNUD 2022**). A next step would be to develop a more thorough platform that allows higher levels of interaction. In addition, this information should be articulated with the national information systems (e.g. authoritative sources in different areas, information of STI projects, policy initiatives etc) including sections to publish governmental requests and ideas for action by CSS initiatives.

Narratives: A & B

Target: Ministry of STI

5.1.2. To produce and/or make available protocols for CSS data quality control and integration with other public administration sources

Although policymakers usually pointed out that it is not mandatory that qualified experts mediate the information or activities produced in CSS projects, they considered it is required to create protocols to guarantee that the knowledge produced can be effectively taken up by the policy administration. This includes facilitating the understanding of standards implemented in CSS projects and how its information can be combined with that of authoritative sources (e.g. Environment, STI, Infrastructure, etc.). It is easier for policymakers to use data and information produced by CSS projects if it was linked to existing frameworks of information processing. Therefore, CSS projects could be more easily linked to policy decision-making arenas if some of the information they produced can be presented alongside public sources (complying with standard formats or metadata records, for example).

Narratives: A & B

Target: Ministry of STI with other relevant public authorities

5.1.3. To provide cloud space for CSS initiatives and assistance to guarantee open data standards

A common challenge in research is the access to secure and sustainable digital environments that allow the preservation of information as well as the development of research activities. In Argentina, a national law requires STI organisations to create their institutional repositories. However, as CSS projects are still not well integrated in the research systems and funding schemes, they are still orphan regarding data protection. In addition, infrastructure is a particularly salient need in this case because it is required for project development, interactions and creation of a community of practice, besides data security. CSS must comply with open data standards, including issues related to reproducibility and accessibility, as well as the protection of sensitive information

Narratives: A & B

Target: Ministry of STI

5.2. To articulate CSS with existing policy participatory mechanisms

There are several participatory mechanisms currently in place for sanitation policy in the basin (such as consultations, work-tables, public audiences, Escazú agreement, community protocols). However, people get disappointed in policy participatory processes if policy actions are delayed or if their claims are not translated into action. A CSS approach, which involves generation and access to information, in a flexible and long-term basis, may promote participation and create knowledge that could be useful for local authorities (e.g. to anticipate potential conflicts, to gather available information systematised by the communities, etc.). If these participatory processes were connected to CSS initiatives, a mechanism for back-and-forth information may be more easily created. Policy decisions would be informed by these instances and by being engaged with CSS projects they would report back on their final decision-making using the same communication channels. Environmental justice is a collective issue and therefore citizen participation could be better guaranteed through the frameworks of CSS initiatives that connect professional experts with the communities, providing opportunities to engage in knowledge production activities that enhance the understanding and discussion of problems and solutions.

Narrative: B

Target: Municipalities, Provincial and National authorities

5.3. To include CSS as a tool for policy making and implementation

One step further in the connection between policy making and CSS project would be to use this framework to create new information needed to improve the design, implementation, monitoring and evaluation of policy solutions. To achieve this, there are several policy innovations to put forward.

5.3.1. To reform normative frameworks to allow public institutions to formally interact with CSS initiatives

CSS that links to policymaking processes can deliver innovative governance perspectives and therefore challenge the existing institutional frameworks of interaction between policy bodies and society. To embed CSS in policy instances, the normative frameworks governing policy making must be adapted. This includes both, the recognition of CSS information as a valid source of information and input in the decision-making processes, and to allow funding CSS activities when they are used in policy making (i.e. create funding mechanisms to allow the expansion of CSS initiatives, such as buying materials, ensure connectivity for certain activities, funding capacity building and network creation activities, etc.). In order to establish contact with CSS projects and fund them, the government bodies should change their public bidding processes; there are previous experiences to consider social actors such as cooperatives, and not exclusively businesses.

Narratives: A & B

Target: National and Provincial authorities

5.3.2. To create areas in public policy organisations to articulate with CSS initiatives

This refers to the establishment of points of contact in the local bureaucracies that can act as liaisons between the policy making authorities and officials and the CSS community. The link between them will be more fruitful if proximity is considered. The creation or use of existing physical spaces for interaction (e.g. community spaces managed by municipalities or citizen labs) and/or specific areas in municipalities organisation charts for connecting with CSS projects, could contribute in this regard. Local decision-makers could identify projects they wish to support, engage in dialogues to co-create knowledge that could be of relevance for unattended issues and become part of a CSS community of practice. In addition, these areas could work as nodes to connect local CSS initiatives with the national information systems.

Narratives: A & B

Target: mainly Municipalities

5.3.3. To engage with CSS initiatives to identify potential public policies' solutions

There is an interest to promote participation not only at informative and consultative stages of the policy process but also to develop better policy solutions, increasing the citizens' involvement at early stages and in a communicative manner that would allow them to influence or adapt decisions. CSS can be a complementary and innovative framework in addition to those already being promoted (such as key stakeholders and other methodologies used in environmental impact studies)

Narrative: A

Target: Municipalities, Provincial and National Authorities

5.3.4. To rely on CSS initiatives to produce data needed for policy monitoring and evaluation

Environmental indicators are built in a combination of both political and technical decisions. These can be better informed by articulating community participation in scientific initiatives that include citizens in knowledge production, data collection for monitoring, evaluation or capacity building purposes (e.g. distribution of micro-sensors through CSS initiatives to multiply monitoring points of environmental quality parameters; innovative ways of building participatory indicators; scientific literacy activities; etc.). As mapping processes are expensive, CSS initiatives can be a means to improve local governments efficiency when facing budget constraints. In addition, conflicts in environmental policy could be relaxed because data and community engagement can be supportive of the strategies of government officials that may be advocating for change in the policy arena.

Narrative: B

Target: mainly Municipalities

5.3.5. To implement and adjust public policy actions experiments in collaboration with citizens through CSS initiatives

The governments may need to implement policies that require the production of granular and updated information that is very expensive to produce. CSS projects can be identified or developed to address this policy gap.

Narrative: B

Target: Any public authority considering participatory and innovative policy processes

5.4. To generate CSS data for environmental impact assessment

Environmental impact assessments are currently developed by service providers. CSS initiatives could contribute to environmental impact assessments in innovative ways by allowing citizens to be involved and accomplish the principle of participation mandate in the National Environmental Law that, so far, is implemented only as information provision and non-binding consultation.

Narrative: B

Target: Municipalities

5.5. To explore landscape impact assessment and combine it with CSS

The landscape is the spatial and visual expression of the environment, it takes into consideration the perception capacity of the observer and its aesthetic values. Thus, the assessment is intrinsically related with the subjectivity of the observer. Policy bodies will then decide based on the relevance of the elements being valued in the landscape and the representativeness of subjectivities doing the evaluations. It is a type of environmental impact assessment that allows the incorporation of qualitative and subjective values which are not considered in traditional environmental impact studies –as currently done in Argentina. A CSS approach could contribute to landscape assessment since community actors directly affected by changes in the landscape could share their perceptions and experiences using protocols to systematise the generation of information. This information could be combined with other from authoritative sources and analysed with scientific methods before policy decisions take place.

Narrative: B

Target: National Authorities, e.g. Ministry of Environment, National Congress

5.6. To promote synergies between environmental education and CSS

Environmental education is a training process aimed at raising awareness, values and attitudes that are consistent with a balanced environment and a preservation of natural heritage. In Argentina there is a recently signed National Integrated Law on Environmental Education that seeks to generate environmental skills and attitudes at all levels. There are important synergies with CSS initiatives studying environmental issues. From one side, because CSS also promotes a community appropriation of knowledge regarding the environment. In addition, people participating in CSS become trained in environmental concepts and new environmental data and tools are created. From the other side, as environmental education makes more people sensitive about the environment, more resources may be devoted to environmental CSS initiatives.

Narratives: A & B

Target: Ministry of environment and education, in alliance with provincial government

6. Policy recommendations

- **TO DEVELOP** digital infrastructure to guarantee CSS initiatives recognition and sustainability
- **TO DISSEMINATE** the concept and the potential of CSS in improving policy responsiveness and accountability
- **TO PROMOTE** CSS projects by creating new funding schemes linked to public policy needs
- **TO RECOGNISE** CSS as a valid research approach in existing public funding calls and instruments in research and education institutions
- **TO CREATE** synergies with existing public participation regulations and mandates in environmental policy
- **TO ENHANCE** the synergies between CSS and environmental education mandates

7. Transferability to other regions

The situation in the MRB is quite unique and extreme, but the participatory mandate in environmental policies has been agreed internationally and goes beyond this situation. Thus, we believe that findings presented here can be reasonably transferred elsewhere. Policy makers in Argentina are optimistic about the contribution of CSS approach in policy making. Their most favourable opinion regarding the specific contributions of CSS is in relation to promoting citizen participation –rather than just data generation. Some informal exercise we carried out in Europe (Q-method with policy makers in Barcelona and interactive sessions organised at ECSA 2022) make us confident that our results could be informative for that region too.

8. Sources

Secretaría de Ambiente y Desarrollo Sustentable de la Nación (SADS)
Guía para fortalecer la participación pública y la evaluación de los
impactos sociales. - 1a ed. - Ciudad Autónoma de Buenos Aires: Secretaría
de Ambiente y Desarrollo Sustentable de la Nación, 2019.

Argentinian National Environmental Policy Law 25.675

<https://www.argentina.gob.ar/normativa/nacional/ley-25675-79980>

Argentinian Environmental Education Law 27.621

<https://www.argentina.gob.ar/normativa/nacional/ley-27621-350594/texto>

Cohen, & Doubleday, R. (2021). *Future directions for citizen science and public policy*.
Centre for Science and Policy.

<https://www.csap.cam.ac.uk/media/uploads/files/1/future-directions-for-citizen-science-and-public-policy-web-v6.pdf>

European Commission. Directorate General for Research and Innovation. (2022). *Mutual learning exercise on citizen science initiatives: Policy and practice. First topic report, Introduction and overview of citizen science*.

Publications Office. <https://data.europa.eu/doi/10.2777/29886>

EPA (2021). *Learn About Environmental Justice*. Retrieved from:

<https://www.epa.gov/environmentaljustice/learn-about-environmental-justice#eol2898>

Escazú Agreement <https://www.cepal.org/es/acuerdodeescazu>

MINCYT-PNUD 2022, *Ciencia Ciudadana. Mapeo de iniciativas nacionales. Segunda edición 2022*, Ciudad Autónoma de Buenos Aires: Ministerio de Ciencia, Tecnología e Innovación de la Nación (MINCYT)-Programa Naciones Unidas para el Desarrollo (PNUD), https://www.argentina.gob.ar/sites/default/files/mapeo_de_iniciativas_2da_edicion_mincyt.pdf.

Sauermann, H., Vohland, K., Antoniou, V., Balázs, B., Göbel, C., Karatzas, K., Mooney, P., Perelló, J., Ponti, M., Samson, R., & Winter, S. (2020). Citizen science and sustainability transitions. *Research Policy*, 49(5), 103978.

<https://doi.org/10.1016/j.respol.2020.103978>

9. Links to original research

- More information about the CoAct project:

www.coactproject.eu

- More information about R&I Action #3 Environmental Justice:

<https://farn.org.ar/coact-justicia-ambiental>

- Videos of CoAct Environmental Justice:

“What does the Matanza-Riachuelo Basin mean to you?”

<https://www.youtube.com/watch?v=5-yETnz8JXs>

“What is the ‘Qué Pasa, Riachuelo?’ Platform?”

<https://www.youtube.com/watch?v=kfiX4Rr48rU>

“How has the citizen social science project impacted on your life?”

<https://www.youtube.com/watch?v=mazMXEp9zcU&t=3s>

“CoAct Environmental Justice - Development phases of ‘Qué Pasa, Riachuelo?’ Platform” <https://www.youtube.com/watch?v=fBhaYC7gNb4&t=117s>

- Policy workshop blogs:

by UNSAM: <https://fund-cenit.org.ar/dialogos-entre-ciencia-ciudadana-y-politica-publica-participacion-ciudadana-en-problemas-socio-ambientales/>

by the Ministry of STI of Argentina:

<https://www.argentina.gob.ar/noticias/ciencia-ciudadana-y-politicas-publicas-para-tratar-problemas-socioambientales>

Annex A. Participation mandate and open science

We present the most important events that introduced community participation as a request in environmental regulations and laws, both internationally, nationally and locally for the MRB. We also highlight the main regulations to promote open and citizen science in Argentina.

A.1. International and regional regulatory frameworks

The Rio Declaration developed in the context of 1992 United Nations “Conference on Environment and Development” established the basic principles for environmental democracy, which included access to information, public participation and access to justice. In 1994 Argentina signed the Convention on Biodiversity that was established by the Rio Declaration.

Environmental democracy implies that decisions regarding the environment are subject to public deliberation and monitoring. This requires that public policy governance includes procedures to facilitate public participation. In particular, the 10th principle of the Rio Declaration, focused on the citizens’ rights of access to information, participation and justice.

The Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean, adopted in Escazú, Costa Rica in 2018, ratifies the commitments to the 10th Principle. It seeks to strengthen citizen rights to participate in environmental decision-making through specific forms of policy governance. It establishes actions for the creation and strengthening of capacities and cooperation, as well as specific provisions on environmental human rights defenders. The Escazú Agreement entered into force in April of 2021 for signatory countries.



Figure A.1
Escazú Agreement Principle 7 – Public Participation. Source: ECLAC 2021.

A.2. National regulatory frameworks

The National Constitution reform of 1994 incorporated Article 41 which includes the rights to a healthy environment and access to environmental information and education. National Environmental Law was promulgated in 2002, with specific articles regarding public participation. It established the right of every citizen to participate in impact evaluation processes and in environmental plans. The Law also requested authorities to guarantee appropriate mechanisms for participation. Different provinces have also established participatory rights in their constitutions and through different laws (SADS, 2019). The main mechanisms that are implemented for citizens to participate are public consultations and audiences although there are some recommendations to include social actors in the environmental impact studies too (SADS, 2019).

In 2020 by Law 27.566 Argentina ratified the principles of access to information, justice and participation signed in the Escazú Agreement. One specific commitment of Escazú was to implement environmental education, which in Argentina was adopted by the enactment of an Integrated Environmental Education Law 27.621 in 2021.

In addition, citizen participation is a specific judicial mandate in the MRB sanitation policy. Actually, citizen participation has pushed for policy transformation in this territory when, in 2004, a group of neighbours filed a lawsuit against the National State, the Province of Buenos Aires, the Autonomous City of Buenos Aires and 44 companies claiming damages suffered as a result of the contamination. After some back-and-forth the Supreme Court admitted the demand, considering that collective damage was involved. In 2008 it ruled for the creation of an Integrated Sanitation Plan (PISA) which was to be administered by the recently created interjurisdictional authority (ACUMAR). The plan had to include environmental regulation of the basin, the control of anthropic activities, an environmental education program and a public environmental information program. The judicial mandate ordered to “enable citizen participation in the control of compliance of the plan” (Supreme Court, 2008) and established that such control had to be organised by a collegiate body capable of receiving suggestions by citizens and translating them into appropriate procedure. The collegiate body was formed by environmental and human rights non-governmental organisations (some of which had been included as demand part in the lawsuit) and coordinated by the ombudsman. These organizations make observations on the different sanitation policy actions and incorporate them in the judicial instances and negotiate or pressure them in political instances. In addition, PISA included a Participation Programme, that gathered social organisations with government institutions to build a shared vision of the basin.

But participation in sanitation policy has not been truly achieved. Although the community is highly mobilised, decision-making continues to be highly top-down. In judicial terms, bureaucracy makes it very complex for affected communities

to effectively claim for their rights and/or connect those claims with the main mandate. There is no ombudsman nominated since 2009, which means in practice that communities cannot find an effective channel to claim their rights in justice. In the policymaking sphere, ACUMAR has the legal obligation to open spaces for deliberation and participation and since its origins there is a commission for participation. In 2016 ACUMAR updated the PISA, acknowledging that participation and citizen control and monitoring should be established through different lines of action, such as environmental ordering of the territory, environmental education to promote critical perspectives in the basin's population and the effective intervention of the Social Participation Commission (ACUMAR, 2016). Formal organisations participate in the Collegiate Body, but not citizens directly. There were very few meetings organised and there are very few formally established procedures or instances for citizen participation that has a clear binding result. As an example, in 2021 the Commission reported 127 events organised by the Social Participation Commission, but only a few were formal instances of public opinion provision, while others were mainly diffusion and dialogue building activities (ACUMAR, 2021).

A.3. National Open Science window of opportunity

In Argentina there is a window of opportunity to advance open science practices in general, with several institutional and policy initiatives that create incentives for citizen participation in scientific activities. In 2013 the Law 26.899 mandated the creation of institutional repositories for the open access to research results, including data. Since then, there have been government efforts to acknowledge the potential of open and collaborative practices. According to the Law public research institutions must create digital repositories as well as policies to ensure the deposit and preservation of the publicly funded research produced by their members and to request and assess data management plans in their call for proposals.

In addition to this legal framework, the National Ministry of Science, Technology and Innovation developed an Open Data programme and has promoted the diffusion of Open and Citizen Science since 2018: it supported the first edition of the Argentinean Congress of Open and Citizen Science; co-organised a series of workshops of Open and Citizen Science; and established an Open Science Committee in 2020 to develop recommendations for science policy development.

Citizen Science initiatives have been catching governmental attention in the past years. The national Ministry of Science, Technology and Innovation in coordination with the United Nations Development Program mapped the existing projects on environmental issues, creating both a report and a section in the ministry's webpage to access the initiatives' details. Recently (October 2022) the Ministry announced the launch of a National Citizen Science Program that seeks to continue with the identification of this type of projects and support them.

References

- ACUMAR, 2016, "Integral Environmental Sanitation Plan". Available at <https://www.acumar.gob.ar/wp-content/uploads/2016/12/PISA-2016.pdf>. Last access 24/10/2022
- ACUMAR, 2021, "Complementary information. 06 - Social participation actions in the territory of the WRC - Year 2021". Available at <https://www.acumar.gob.ar/wp-content/uploads/2016/12/Detalle-2021.pdf>. Last access 19/10/2022.
- ECLAC, 2018, "Regional Agreement on Access to Information, Public Participation and Access to Justice in Environmental Affairs in Latin America and the Caribbean". LC/PUB.2018/8/Rev.1. Available at https://repositorio.cepal.org/bitstream/handle/11362/43583/1/S1800428_en.pdf. Last access 24/10/2022.
- ECLAC, 2021, "Public participation in environmental processes". Available at https://observatoriop10.cepal.org/sites/default/files/escazu_agreement_art_7_en.pdf. Last access 24/10/2022.
- Law 26.899 of 2013, "Sistema Nacional de Ciencia, Tecnología e Innovación". December 3, 2013. O.J. No. 32.781. Available at <https://www.boletinoficial.gob.ar/detalleAviso/primera/98996/20131209>. Last access 24/10/2022.
- Law 27.566 of 2020, "Acuerdo regional sobre el acceso a la información, la participación pública y el acceso a la justicia en asuntos ambientales en America Latina y el Caribe, celebrado en la ciudad de Escazu -República de Costa Rica ". October 19, 2020. B.O. No. 34,500. Available at <https://www.boletinoficial.gob.ar/detalleAviso/primera/236220/20201019>. Last access 24/10/2022.
- Law 27.621 of 2021, "Ley para la implementación de la educación ambiental integral en la República Argentina ". June 3, 2021. B.O. No. 34.670. Available at <https://www.boletinoficial.gob.ar/detalleAviso/primera/245216/20210603>. Last access 24/10/2022.
- Secretariat of Environment and Sustainable Development of the Nation (SADS), 2019. "Guide to strengthening public participation and social impact assessment." Autonomous City of Buenos Aires. Available at https://www.argentina.gob.ar/sites/default/files/guia_para_fortalecer_la_participacion_publica_y_la_evaluacion_de_los_impactos_sociales.pdf . Last access 24/10/2022
- Supreme Court Sentence of 2008 "Mendoza, Beatriz Silvia y otros c/ Estado Nacional y otros s/ daños y perjuicios (daños derivados de la contaminación ambiental del Río Matanza - Riachuelo)" July 8th, 2008. Available at: <http://www.saij.gob.ar/corte-suprema-justicia-nacion-federal-ciudad-autonoma-buenos-aires-mendoza-beatriz-silvia-otros-estado-nacional-otros-danos-perjuicios-danos-derivados-contaminacion-ambiental-rio-matanza-riachuelo-fa08000047-2008-07-08/123456789-740-0008-0ots-eupmocsollaf>. Last access 24/10/2028

Annex B. Methodology

This annex describes the activities that were developed in the R&I Action on Environmental Justice to understand and address the potential of the CSS approach for promoting participation in policymaking processes. Throughout the R&I Action #3, 41 actors from the public policy sphere were involved in several activities organised between 2020 and 2022. We present the main ones.

B.1. Knowledge Coalition building

CSS approach aims at involving those affected by social issues throughout the research process in a flexible manner. In the CoAct approach the first step is the creation of a knowledge coalition to contribute to the identification and discussion of the different perspectives on a social issue and to develop synergies that can contribute towards both, the sustainability of the initiative and social transformation. The knowledge coalition works as a network of stakeholders who address fundamental aspects of co-production, including reflections about the politics of knowledge and power dynamics affecting social change (Wyborn et. al., 2019).

In this process we approached policymakers linked to key areas of Environmental Justice (Arza et. al., 2020). A total of 13 policy actors were involved during this stage, conducted during 2020. Through in-depth interviews we identified the positionalities and perspectives of policymakers in different areas regarding the main issues they considered affecting communities, and about the possibilities for participation in decision-making processes. We also organised a participatory workshop, where they discussed with other stakeholders about access to relevant public information and the expectations over the purposes of the citizen science platform to be co-designed.

As a result of this process we identified that citizen participation in knowledge production has a contributory role for policy makers, as it allows for a better identification of community priorities. If successful, this promotes policy actions to be culturally or socially appropriated by the community. They addressed the difficulty of balancing participation and deliberation, particularly in the context of emergency (such as those of Covid-19 times). They also highlighted the lack of appropriate mechanisms that would enable more engaged participation, innovating from traditional consultative approaches (Arza et. al., 2020, p. 45-46).

B.2. Literature review

The perception that there was a lack of mechanisms to implement CSS in policymaking processes led us to attempt to better understand the potential of CSS to contribute to transformative processes by reviewing the existing findings and results from similar processes. We intended to gain insights over the strategies that could

eventually be used to promote the connection between CSS and policy making. To that end we conducted a search in Scopus and qualitatively analysed the results and we also identified and reviewed other sources of literature.

B.2.1. Scopus search

Considering the extensive discussion on the adoption of the term citizen science and the different terms that turned up (and continue to do so) (Eitzel et. al. 2017; Haklay, 2021) and also informed by the discussions of CoAct' state of the art deliverable (Scheller, et al 2020) we used several keywords (top of Figure B.1) to retrieve papers that discussed a broad set of experiences in which participation in research processes had led to some type of relationship with public policy spheres. We found 133 papers published between 2000 and 2021 with that query. We reviewed the abstract of the 125 we could access and selected 59 to conduct the literature review and codification process.

Three key dimensions in the CSS-policy link were used in codification (see Figure B.1):

i) linking mechanism: we consider what aspect of CSS initiatives could be a liaison to public policy; projects may include a variety of activities in which citizens participate but not all of them would seek connection with policymaking. The categories are:

- Citizen generated data: the involvement of citizens in the generation of data that is used in policymaking contexts.
- Participation: the broader involvement of citizens in research activities, such as defining the research questions, methodologies or conducting analysis of evidence. Policymakers interacting with CSS projects may consider the results of citizens' analysis or discuss the topics as framed by the participants in the project's problem definition phase.
- Governance: CSS initiatives in which there is an involvement in research as part of the activities of management of public services or common goods and citizens therefore have a role in their governance.

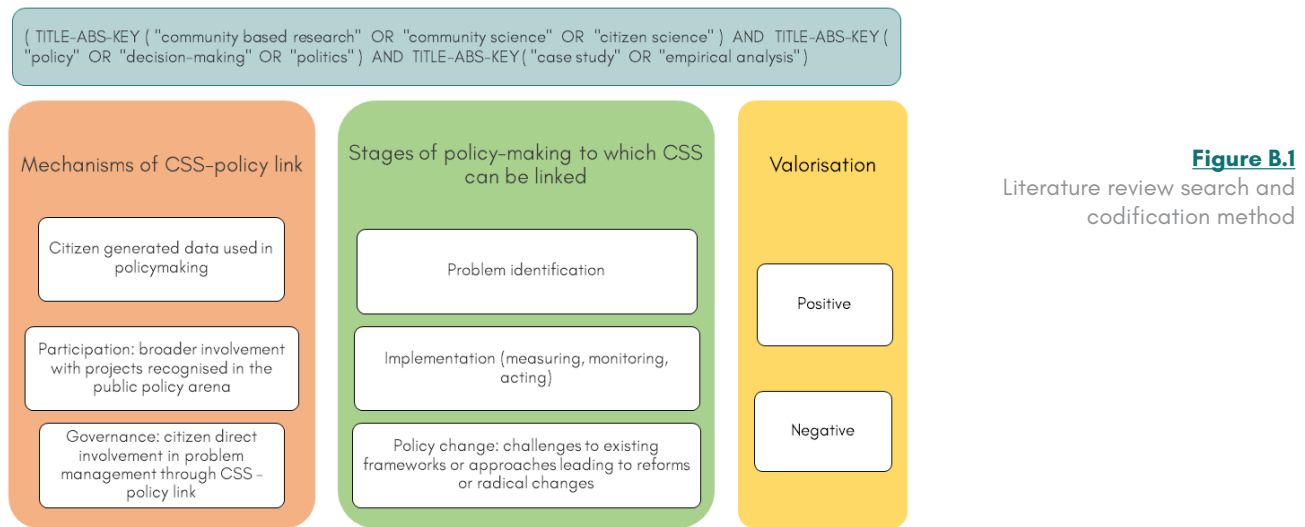
ii) policy-making stages: we consider the different phases of the policymaking processes in which CSS initiatives could be linked. The categories are:

- Problem identification: CSS initiatives may contribute to raise awareness for an issue that then enters the policy agenda.
- Implementation: CSS initiatives may connect to the phase of development or implementation of policy solutions, including measuring, monitoring, mitigation or other actions.
- Policy change: CSS initiatives may explicitly politically challenge the sta-

tus quo and lead to reforms or radical changes such as the creation of new institutions, policy frameworks or measures.

iii) the **valorisation** of such connection. The categories are:

- Positive: when the link is considered beneficial for creating a policy solution.
- Negative: when there are obstacles or problems (e.g. biases) foreseen in the CSS-policy link preventing policy solutions.



B.2.2. Grey literature

In the Latin-American context there had been several discussions of the potential of citizen science, especially in the science policy arena. We analysed and coded claims in 7 documents including video transcriptions.

B.2.3. Environmental citizen science projects database for policy options interpretation

We also produced a list of instruments and tools to connect CSS initiatives with policy making using information from the “Inventory of environmental citizen science projects 2.0”, produced by the Joint Research Centre of the European Commission in a project of 2018 and updated in 2022. We selected the projects listed as having a policy uptake (142) and reviewed the category “Policy uptake explanation” to translate and create policy instruments and tools examples. When the information provided was not sufficient, we browsed the projects websites, eventually reviewing their deliverables reports and publications that were linked to policy issues.

B.3. Q Method

Q-method is a research technique that allows for the identification of patterns of people’s opinions on a given topic, which are analysed and presented as different social perspectives (Webler et. al., 2009). The method allows for the exploration of underlying patterns of meaning and discerning people’s perceptions of their world combining quantitative and qualitative approaches (McKeown & Thomas, 2013). During interviews people are provided with a set of statements expressing ideas on a given topic to order them in a normally distributed grid (Figure 2), with statements located on the far right as those with which the participants highly agree; and in the far left those with which they disagree. Participants are invited to explain the reasons justifying their way or organising statements in the grid.

The participants’ sorts (called q-sorts) are then analysed through statistical techniques and interpreted with the inputs of the interviews. Here we present the different steps implemented for the application of Q-method in our case, used to identify the existing perspectives that policy actors have about linking with CSS initiatives in decision-making processes.

B.3.1. Q-Set

We presented 52 statements to 14 policy actors. Statements were developed through an iterative process by the first two co-authors using a concourse identified during the literature review. The sample was a combination of a theoretical and naturalistic types (McKeown & Thomas, 2013).

For the naturalistic set of statements, we used the transcriptions of the public events in which policy actors in Argentina made affirmations regarding citizen science potential (grey literature). The theoretical set was built using the experiences of 36 selected papers (from the 59 previously mentioned) that were relevant for Environmental Justice –mostly coming from papers related to environmental policy.

The Q-set is distributed across categories of the first two dimensions as shown in Table B.1. Most statements (37) were positive (15 were negative).

		STAGES IN POLICY-MAKING			TOTAL
		IDENTIFICATION	IMPLEMENTATION	POLICY CHANGE	
MECHANISM	CITIZEN GENERATED DATA	6	11	3	20
	PARTICIPATION	5	15	9	29
	GOVERNANCE	1	1	1	3
TOTAL		12	27	13	52

Table B.1

Distribution of statements in across categories in the mechanisms and stages in policy-making dimensions

B.3.2. P-Set

As mentioned, the Q-set was sorted by 14 policy actors (the P-set). The process started with the identification of 93 high-level policy makers in different jurisdiction (Nation, Buenos Aires Province, Buenos Aires City and Municipalities) working on issues closely related to themes defining our R&I Action on Environmental Justice (conservation of natural areas, water quality and resettlement or re-urbanisation of population living in areas of high environmental risks). We managed to interview 9 of them for the Q-method exercise, two thirds from Municipalities. They individually sorted the 52 statement and provided explanations for their preferences.

We also included in the P-Set five policy makers working either on urban issues in Barcelona Metropolitan area or in the science-society links in Barcelona's municipality to identify specificities that may come up in the European context. To that end, a workshop was organised in May 2022 in Barcelona. After a presentation of the main goals and activities of CoAct R&I Action on Environmental Justice, policy makers organised the 52 statements individually in five grids. After finishing, a group discussion was promoted and recorded on the different justifications leading the organisation of the five Q-sorts.

B.3.3. Condition of instruction

Most participants were not familiar with citizen science approaches. Our condition of instruction to those participating included a brief description of the CoAct Project, three examples of local citizen science initiatives and their uptake in policymaking processes and a presentation of the purpose of the Q-method exercise.

When we reached the point of explaining the procedure of the rank-ordering according to bipolar opposites, we asked them to think on whether they agree or disagree with the statements according to their own policy-making reality (i.e. considering their knowledge about nuances of the daily obstacles of sanitation policy implementation).

The grid we presented for ordering the 52 statements was composed of a scale from -5 (highly disagree) to +5 (highly agree), with a distribution of 2, 3, 4, 6, 7, 8, 7, 6, 4, 3, and 2 statements for each level.

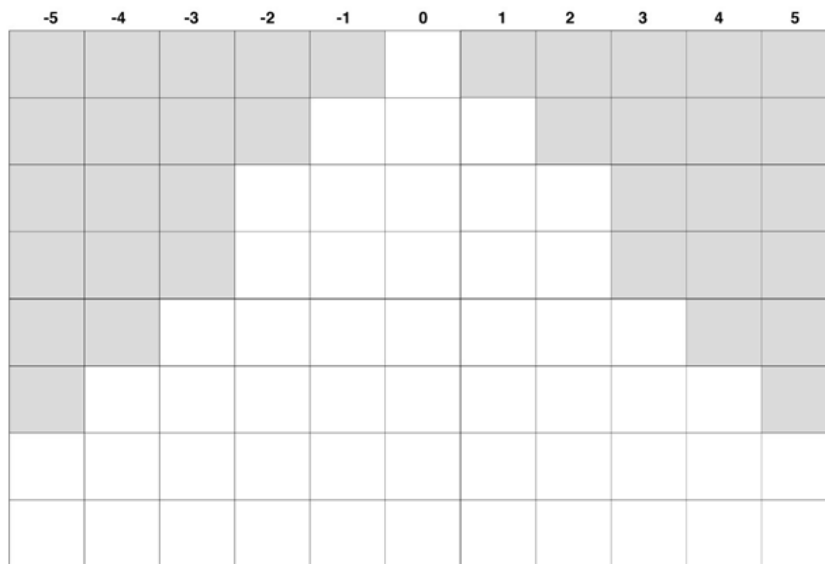


Figure B.2
Grid presented to participants for the Q-sorting process.

B.3.4. Statistical processing details

In Q-method the statistical analysis proceeds by correlating participants' q-sorts. They take the place of variables in factor analysis (McKeown and Thomas, 2013). This is done to identify groupings (called factors) that gather together q-sorts that are the most similar among themselves.

The number of groups (factors) are pre-defined by the researcher according to how many perspectives they think characterise the issue under analysis. In our case, we alternatively opted for two and three factors.

Factor loadings are estimated for each q-sort in relation to each factor. They represent the degree of association of each q-sort to each factor. There are different methods to extract factors. We used principal component analysis which considers both commonality and specificity of the different q-sorts and is probably the most used method in factor analysis (Webler et. al., 2009).

Since each factor is interpreted as a 'social perspective' or 'narrative' in our wording, it does not fully match the view of any single participant individually. We extracted two factors to better balance commonality and specificity among the 14 q-sorts. Ideally, one should have every q-sort associated to at least one factor (otherwise, their perspective would not have been represented in the exercise) and several q-sorts loading heavily in each factor (otherwise, the factor would be the narrative of just one or too few persons). We found that two factors were the maximum possible extraction with our data to comply with these requirements.

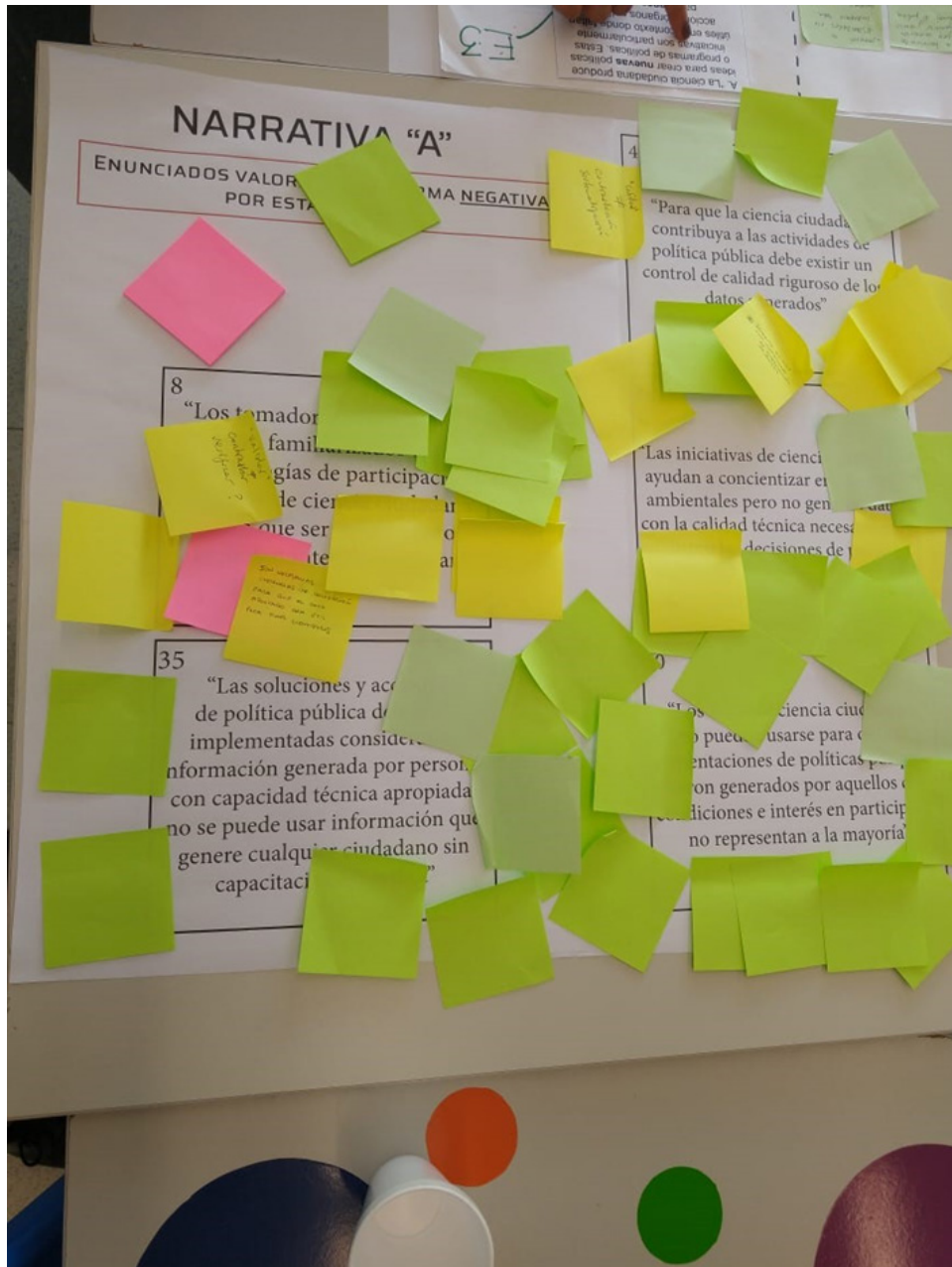
We used the command `qfactor` in Stata 17 developed by Akhtar-Danesh (2018). Factors were then rotated using the varimax method rotation to better identify differences across q-sorts in their loadings to both factors. We report (in Annex C) the rotated factor loadings and the uniqueness indicator which states how much of the variability of the q-sort is not captured by the estimated factors. Finally, to interpret

the 'social perspective' standing for each factor, we calculated the statements' z-scores for each factor using Brown (1980) method. Z-scores measure how far from the centre of the distribution each of the 52 statements is in each estimated q-sort loading 100% for each factor.

B.4. Policy Workshop

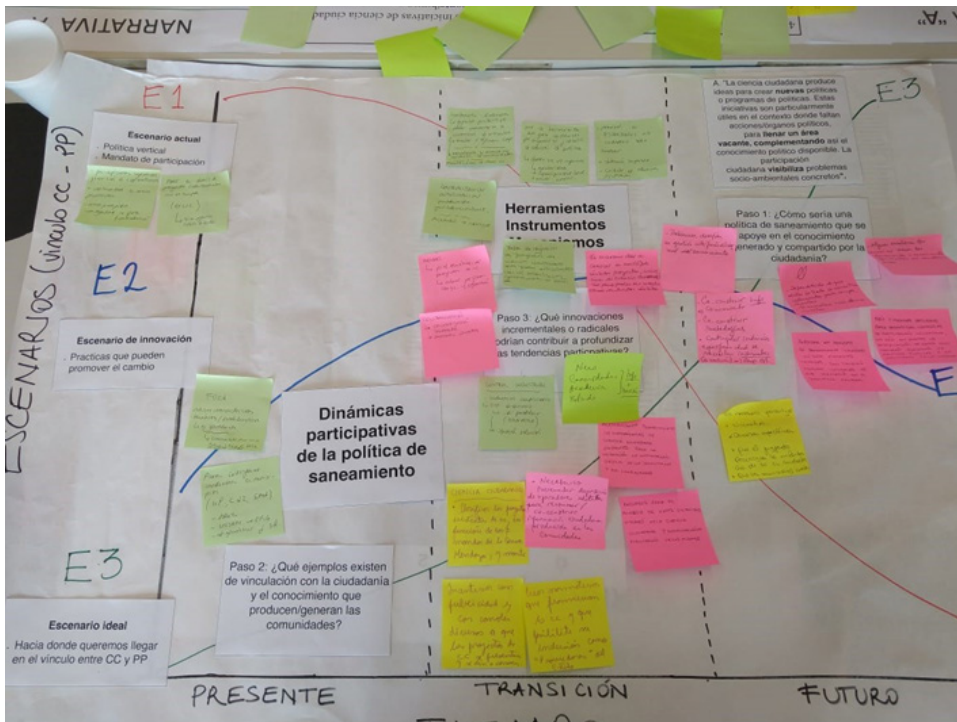
We organised a Policy Workshop in alliance with the Ministry of Science, Technology and Innovation of Argentina and the Argentinean Acceleration Lab of United Nations Development Program (UNDP). The alliance was possible due to the previous trajectory of the UNSAM team with the Ministry developing workshops for the discussion and dissemination of Open Science practices, and the recent mapping process of citizen science initiatives that the Ministry developed with the UNDP, in which CoAct Environmental Justice was included. The workshop was held in September 2022 with the participation of 21 policy makers. There were two participatory exercises.

Firstly, we presented the narratives obtained in the q-method analysis and discussed participants' views regarding their meaning. To do this we first collectively addressed the text describing each narrative and then, more specifically, statements located in the far-right and far-left side of estimated q-sorts for each narrative. Participants were asked to use colour post-its to express whether they agreed or disagreed with the specific positions statistically obtained for the q-sort corresponding to each narrative. More specifically, we just discussed the position of 10 of the 52 statements (five in the far-right part of the grid and five in the far-left) for each narrative, as seen (partially) in Picture B.1. We then collectively discussed these reactions.



Picture B.2
Participatory exercise to validate narratives. Note: the picture only shows five statements located in the far-left (highly disagree section) of Narrative A and positive (green), neutral (yellow) and negative (pink) reaction by policy workshop participants.

The second exercise was an adaptation of three-horizon prospective method (Sharpe, 2016) in three steps, as shown in Picture B.2. We first worked on better specifying what the ideal scenario of linking sanitation policy and CSS projects would look like. Then we identified some practices that currently exist in public policy making and that can facilitate this link. Finally, we reflected on what innovations are needed in practices and tools of policy formulation to make the most of the CSS-policy connection. Inspired on this discussion and in the literature, review mentioned in section B.2 we developed the policy options presented in the policy brief.



Picture B.3

Adapted version of three-horizons exercise
 Note: three moments in time present, transition and future and three scenarios: current (red), innovative (blue) and ideal (blue). Post-its represent policy-making practices in different scenarios and time.

References

- Arza, V., Actis, G., Velarde, M., Cane, S., Buchsbaum, M., & Swistun, D. (2020). CoActD5.1: Knowledge Coalition Building. Environmental Justice. <https://doi.org/10.5281/zenodo.4443441>
- Akhtar-Danesh N. qfactor: A command for Q-methodology analysis. The Stata Journal. 2018;18(2):432-446.
- Brown, S. R. 1980. Political Subjectivity: Applications of Q Methodology in Political Science. New Haven, CT: Yale University Press
- Sharpe, B., A. Hodgson, G. Leicester, A. Lyon, and I. Fazey. 2016. Three horizons: a pathways practice for transformation. Ecology and Society 21(2):47. <http://dx.doi.org/10.5751/ES-08388-210247>
- Bonney, R. (2009). Public Participation in Scientific Research: Defining the Field and Assessing Its Potential for Informal Science Education. A CAISE Inquiry Group Report. Online Submission. <https://eric.ed.gov/?id=ED519688>
- Eitzel, M. V., Cappadonna, J. L., Santos-Lang, C., Duerr, R. E., Virapongse, A., West, S. E., Kyba, C. C. M., Bowser, A., Cooper, C. B., Sforzi, A., Metcalfe, A. N., Harris, E. S., Thiel, M., Haklay, M., Ponciano, L., Roche, J., Ceccaroni, L., Shilling, F. M., Dörler, D., ... Jiang, Q. (2017). Citizen Science Terminology Matters: Exploring Key Terms. Citizen Science: Theory and Practice, 2(1), 1-20. <https://doi.org/10.5334/cstp.96>
- European Commission, Joint Research Centre (JRC) (2018): An inventory of citizen science activities for environmental policies. European Commission, Joint Research Centre (JRC) [Dataset] PID: <http://data.europa.eu/89h/jrc-citsci-10004>
- Haklay, M., Fraisl, D., Greshake Tzovaras, B., Hecker, S., Gold, M., Hager, G., Ceccaroni, L., Kieslinger, B., Wehn, U., Woods, S., Nold, C., Balázs, B., Mazzonetto, M., Ruefenacht, S., Shanley, L. A., Wagenknecht, K., Motion, A., Sforzi, A., Riemenschneider, D., ... Vohland, K. (2021). Contours of citizen science: A vignette study. Royal Society Open

Science, 8(8), 202108. <https://doi.org/10.1098/rsos.202108>

Haklay, M. (2018). Participatory citizen science. En S. Hecker, M. Haklay, A. Bowser, Z. Makuch, J. Vogel, & A. Bonn, *Citizen Science: Innovation in Open Science, Society and Policy*. (pp. 52–62). UCL Press. <http://discovery.ucl.ac.uk/10058422/>

Mathews, A. L., Coyle, B. S., & Deegan, M. M. (2015). Building Community while Complying with the Affordable Care Act in the Lehigh Valley of Pennsylvania. *Progress in Community Health Partnerships: Research, Education, and Action*, 9(1), 101–112. Scopus. <https://doi.org/10.1353/cpr.2015.0000>

McKeown, B., & Thomas, D. B. (2013). *Q methodology* (Vol. 66). Sage publications.

Scheller, D., Thomas, S., Arnold, A., Wissenbach, K. R., Mboa Nkoudou, T. H., Cigarini, A., Bonhoure, I., Perelló, J., Mayer, K., Kieslinger, B., Schäfer, T., Schürz, S., Wöhrer, V., Wintersteller, T., Malik, M., Lombion, C., Winfree, L., Arza, V., Mitats, B., ... Pío, M. J. S. (2020). *CoActD2.1: Report on State of the Art of Citizen Social Science*. <https://doi.org/10.5281/zenodo.4810909>

Webler, T., Danielson, S., & Tuler, S. (2009). Using Q method to reveal social perspectives in environmental research. *Greenfield MA: Social and Environmental Research Institute*, 54, 1–45.

Wyborn Carina, Amber Datta, Jasper Montana, Melanie Ryan, Peat Leith, Brian Chaffin, Clark Miller, and Lorrae van Kerkhoff. (2019). "Co-Producing Sustainability: Reordering the Governance of Science, Policy, and Practice". *Annual Review of Environment and Resources*. Vol. 44:319–346.

Annex C. Results of Q method analysis

Table C.1 presents the result of extracting two factors using principal components analysis. There were 8 participants whose q-sort loaded on factor 1 (Narrative A) and 6 with factor 2 (Narrative B). All q-sorts significantly relate to one factor, most of them with a positive relationship except for one (marked in red). That participant also shows a high uniqueness meaning that their view is not largely captured by factor extraction. Most participants loading positively on factor 1 do not work on environmental but on other aspects of policy making.

PARTICIPANT	JURISDICTION	WORKING ON ENVIRONMENTAL POLICY?	ROTATED LOADINGS ON FACTOR 1	ROTATED LOADINGS ON FACTOR 2	UNIQUENESS	FACTOR
P20	Municipality	Yes	0,65	0,00	58%	1
P21	Barcelona	No	0,64	-0,07	59%	1
P24	Barcelona	No	0,62	0,28	54%	1
P22	Barcelona	No	0,62	0,27	54%	1
P26	Municipality	No	0,56	0,47	46%	1
P23	Barcelona	No	0,54	0,21	66%	1
P28	Municipality	No	0,54	0,38	56%	1
P27	Provincial	Yes	-0,41	0,27	76%	1
P30	Municipality	No	0,44	0,68	35%	2
P19	National	Yes	0,40	0,71	35%	2
P25	Barcelona	No	0,33	0,45	69%	2
P18	National	Yes	0,27	0,49	68%	2
P17	Municipality	Yes	-0,11	0,70	50%	2
P29	Municipality	Yes	-0,18	0,75	40%	2

Table C.1

Participants' profiles, factor loadings (after rotation) and uniqueness.

To facilitate interpretation of the narratives standing for each factor we analysed the location of statements in the estimated q-sorts that load 100% in each factor. Location in relation to the center value is given by the statements z-scores. We paid attention to statements' coding mentioned in the Annex B: types of mechanisms to link CSS initiatives with policy making processes; stages in policy making processes to which CSS could be linked, and valorisation of the CSS-policy link (positive or negative).

Table C.2 presents the most salient statements for each factor located in the right side of the distribution (i.e. the most positive z-scores that are high just for one of the factors). As can be seen, there is a common ground in terms of the mechanisms and valorisation: the most salient statements in both narratives are positive claims and relate to participation or governance. Some difference can be found in relation to the policy stage: while salient statements for factor 1 relate to problem identification or policy change, in factor two they mostly relate to implementation.

Statements on the opposite side of the distribution (i.e. 'disagree' part of the q-sort grid or highly negative z-score) are all of them negative, for both factors. In other words, both narratives disagree with negative claims on the relation between CSS and policy-making, particularly regarding data quality (e.g. one consensus statement for which both narratives disagree the most states "CSS data cannot be used to define policy orientation because they were generated with those with interests and conditions to participate which do not represent the majority"). For the other dimensions, we also found no relevant difference across factors in this side of the distribution.

The second step to facilitate interpretation was to compare factors by calculating their mean z-scores in different categories for relevant dimensions.

FACTOR	MECHANISM	POLICY STAGE	VALORISATON	STATEMENT
1	Participation	Identification	Positive	"CSS makes environmental problems visible and allows to link public policy with citizenship in issues that have not been attended yet by public administrations"
1	Participation	Policy change	Positive	"CSS initiatives allow for citizens to promote the adoption of solutions when the State has not produced public policies yet"
1	Governance	Policy change	Positive	"CSS initiatives contribute to connect actors and improved their capacity to solve problems; this could promote participatory ways in environmental policy governance"
2	Participation	Implementation	Positive	"CSS initiatives, by involving participants from the communities in the investigations make the research agendas better aligned with public policy goals"
2	Participation	Implementation	Positive	"CSS initiatives, by observing, documenting and classifying local knowledge about the environment can contribute to improve policies' efficacy in different contexts"
2	Participation	Policy change	Positive	"More relevant public policies in environmental issues can be established through citizenship and science mobilisation"
2	Governance	Implementation	Positive	"CSS initiatives in which there is participation in natural resources management improve trust relationships between public policy managers and the involved citizens"

Table C.2

Salient statements for each factor located in the right side of the distribution (strongly agree section of the q-sort grid).

Table C.3 shows factors' z-scores across the valorisation dimension. In the Q-sample there were 15 negative statements (texts that expressed negative claims about some aspects of the CSS-policy link) and 37 positive statements (texts that expressed positive claims). The table shows that there is not much difference across factors; both narratives agree with positive statements (their position is estimated to be on the right side of the grid) and disagree with negative ones (i.e. their location is estimated to be on the left side of the grid). As noted before, these results suggest that policy makers are optimistic about the potential link between CSS initiatives and policy making.

Table C.4 and C.5 organise only positive statements across categories for the mechanisms and policy stage dimensions. Table C.4 shows participation and governance are the mechanisms most positively appraised; much more than the potential availability of citizen generated data. Again, in this case there is not much difference across factors. But, as before, differences arise when analysing the policy-making stages (Table C.5). In this case, narrative A (factor 1) suggests that CSS could contribute to the **identification** of problems not being addressed in policy making or in challenging existing policies and creating opportunities to **change policy**. Z-scores are much larger for factor 1 for both stages of policy making. The opposite is true for the **implementation** phase. In this case, 'implementation' statements are located in the centre of the distribution for factor 1 (i.e. narrative A is neutral to this kind of claims) while narrative B (factor 2) tends to particularly agree with these claims.

All in all, and together with the qualitative analysis of the participants' explanations about why they locate statement in one or another place, we conclude that the perspectives are different but non-confrontational (Webler et. al., 2013). Both narratives share a common ground in the way they value participation but they differ regarding what stages or aspects of policy making there is more potential to promote beneficial links with CSS initiative. One of them (Narrative A) finds the potential in complementing knowledge to make policies more responsive to problems not addressed by policy institutions, while the other (Narrative B) believes in synergies between CSS and policy making and perceives that the highest contribution is in improving policy implementation.

	N	Zscore factor 1	Zscore factor 2
Positive statements	37	0.3674	0.3575
Negative statements	15	-0.9062	-0.8818

Table C.3

Mean z-scores by positive and negative statements

	N	Zscore factor 1	Zscore factor 2
Citizen Data	11	-0.074	-0.055
Participation	23	0.460	0.459
Governance	3	1.277	1.091

Table C.4

Mean z-scores by mechanisms of CSS - policy link, only positive statements.

	N	Zscore factor 1	Zscore factor 2
Identification	9	0.735	0.361
Implementation	19	0.047	0.370
Policy change	9	0.677	0.327

Table C.5

Mean z-scores by stage of policymaking for which the CSS link could take place, only positive statements.

References

Webler, T., Danielson, S., & Tuler, S. (2009). Using Q method to reveal social perspectives in environmental research. Greenfield MA: Social and Environmental Research Institute, 54, 1-45.

CoAct

DOI: 10.5281/zenodo.7249193

Cite as: Actis, Guillermina, Arza, Valeria, Cané, Santiago. (2022). Citizen Social Science for Sanitation Policy in the Matanza-Riachuelo Basin. Zenodo.
<https://doi.org/10.5281/zenodo.7249193>



This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.
<https://creativecommons.org/licenses/by-nc-sa/4.0/>

The CoAct project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 873048

