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Mapa Verde: Participatory Cartography and Technological Imaginaries of the Young Environmental Movement in Uruguay

Victoria Gómez Márquez, Carolina Garzón Díaz, and Tatiana Oviedo Curbelo

Faculty of Communication, Universidad de Montevideo, Uruguay

Correspondence: Victoria Gómez Márquez (vgomez@um.edu.uy)

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Abstract

This article examines Mapa Verde, a participatory digital mapping project co-created by young environmental activists and academic researchers in Uruguay between 2023 and 2025, from the perspective of participatory action research along with social and technopolitical cartography. Drawing on the observation and systematization of collaborative workshops, revision of periodical reports of activities and outcomes, and in-depth interviews with the young activists involved in the participatory cartography, the article reconstructs and interrogates the co-creation process: diagnosis, construction, and evaluation (Calvo & Candón-Mena, 2023). It also analyzes youth imaginaries regarding digital media activism and environmental advocacy through counter-mapping. Pragmatic and critical imaginaries of digital media for activism are found among the young participants who created Mapa Verde, while the collaborative enterprise reflects community-based communication and some traces of counter-data mapping that strengthen identity and foster inter-organizational collaboration. The project expands participatory cartography practices in political ecology and environmental communication, highlighting youth as both agents and cartographers of environmental action. The process shows that mapping is not only a technical exercise but also political, cultural, and pedagogical, enabling new forms of participation and knowledge production.

Keywords

counter-data mapping; digital activism; environmental activism; mapping; participatory cartography; technological imaginaries; youth environmental movement

1. Introduction

Following the 2019 climate protests inspired by Greta Thunberg's school strike, young people have consistently been associated with environmental action. However, many youth activists feel they are poorly represented in public discourse and that their diverse collective actions are reduced to the most visible Fridays for Future protest (Gómez Márquez et al., 2022; Herfort et al., 2023). With scholarship about the phenomenon mostly focused on the Global North, questions arise regarding who young environmentalists really are in each country, where and how they collectively operate, what issues they prioritize, and how they relate to media and communication as visibility and advocacy tools. Furthermore, as signs of limited influence on "adult" agendas persist (Herfort et al., 2023), action research could help strengthen the movement.

In Latin America, cartography as a social work methodology has been widespread since the 1970s, initially through critical and transformative research driven primarily by Freire (1970) and his "popular pedagogies." Similar approaches were developed through participatory action research (PAR) by Fals Borda (1985) during the 1970s and 1980s, as well as participatory rural diagnoses promoted by the Food and Agriculture Organization of the United Nations. The centrality of land and geographic space in social conflicts, inequalities, and power struggles has contributed to the high prevalence of participatory cartographic methodologies across the region. Over time, the integration of these practices with digital technologies has expanded the scope of participation and mapping, consistently seeking to engage social groups—organized or not—who are directly connected to the mapped territory or to the georeferenced phenomenon. Digital cartographies have become popular worldwide in digital activism, allowing communities to gain visibility, strengthen their collective identity, and establish networks (Cobarrubias & Pickles, 2008; Pánek, 2016; Pezzullo, 2020). As Calvo and Candón-Mena (2023, p. 31) state, collaborative cartography goes beyond data extraction and visualization: "It is a procedure that allows the generation of knowledge horizontally with the explicit aspiration of being useful to the communities involved." Therefore, collaborative mapping enables PAR processes involving academia and specific communities (Calvo & Candón-Mena, 2023).

In environmental action, there is a need to develop more social mappings that add to the geophysical ones usually associated with the conservation or restoration of ecosystems (Buckingham et al., 2018). In addition to addressing the cultural construction of the territory from its inhabitants as a key element to think about sustainable development, they have proved useful for mapping ecotourism, agroecology initiatives, and environmental conflicts (Butts & Jones, 2021; Environmental Justice Atlas Team, n.d.; Pinilla et al., 2018; Rye & Kurniawan, 2017; Silva et al., 2018). Mapping also help systematize national experiences in terms of environmental mobilization (Clifford et al., 2013) and environmental social movements (Cobarrubias & Pickles, 2008), while enabling participatory processes (Bryan, 2015) that contribute to the construction of the common (Lydon, 2003; Venugopal et al., 2024) and serve as instruments of environmental advocacy (Pezzullo, 2020).

These practices are closely linked to what has been called digital media activism. As Jeppesen and Sartoretto (2023) explain, and as has earlier been observed in Latin America (Gumucio-Dagron, 2011), it has its roots in alternative communication undertaken by traditionally excluded social groups to articulate and make their voices heard through their own media. As Gerbaudo and Treré (2015) point out, digital media, specifically online social networking platforms, have been used as privileged spaces for political action by a multitude of actors who not only circulate discourses but also produce data, maps, images, and communication devices.

In this context, "the practice of mapping has become popular, constituting an innovation in the repertoires of technopolitical confrontation" (Calvo & Candón-Mena, 2023, p. 25). The environmental movement has adopted mapping as a form of communication, with the Green Map System (US) as a paradigmatic case, focused almost exclusively on the use of maps to promote environmentalism (Williamson & Connolly, 2011). In Uruguay, in response to a request from youth organizations, a local university designed and developed a participatory mapping project in collaboration with them during 2023 and 2024: Mapa Verde (https://mapaverde.uy). These activists and a team of researchers obtained financial support from UNICEF and the US Embassy to create this digital platform, which they currently direct, update, and manage. This article describes and analyzes the participatory mapping process (Bryan, 2015; Chambers, 2006) of Mapa Verde, in dialogue with the stages proposed by Calvo and Candón-Mena (2023): diagnosis–construction–evaluation. Additionally, through in-depth interviews with young promoters of the platform, their technological imaginaries are analyzed in order to understand whether they consider this experience as media activism and counter-data mapping (Jeppesen & Sartoretto, 2023).

2. Mapa Verde: A Participatory Mapping Process

Mapa Verde is the only digital information and communication platform in Uruguay and the region that identifies, highlights, and connects youth environmental initiatives across the country and with society at large. Launched in April 2024, it is an interactive website featuring a georeferenced map of youth-led environmental actions along with an activity calendar and a resource repository. A broader digital ecosystem complements the site, including social media (Instagram, LinkedIn, Facebook) and a WhatsApp community, designed to foster horizontal exchange and strengthen networks among environmentally committed youth.

The centerpiece of the platform is an interactive map featuring 28 active initiatives (as of May 2025), selected from an initial survey of over 100, filtered by criteria of youth leadership and current activity. It is a hybrid cartographic process (Calvo & Candón-Mena, 2023): anchored in the physical, georeferenced space of environmental action, while also connected to the digital sphere where activism unfolds, networks are built, and delocalized actions take place. Conceptually, Mapa Verde defines "youth environmental action" as collectively organized activities aimed at positively impacting the environment through awareness, conservation, education, ecological restoration, eco-friendly products or services, or political advocacy. These actions address key aspects of the so-called triple environmental crisis—climate change, biodiversity loss, and pollution (United Nations Environment Programme, 2021)—and involve youth aged 13 to 29 residing in Uruguay who play central roles in both decision-making and implementation.

Besides being a communication tool, Mapa Verde is a co-creation and participatory mapping process grounded in principles of participation, dialogue, and situated knowledge. From a communication perspective, dialogue—as defined by Bohm (1997) and developed in social change contexts by Obregón and Botero (2011) and Hartz-Karp and Briand (2009)—is a profound exchange process that fosters understanding differences, generating links, and advancing collective meaning construction. In participatory environments, dialogue supports shared visions, tension resolution, and strengthens the community fabric necessary for action.

The following sub-sections present an analysis of the Mapa Verde participatory mapping process, drawing on the methodological proposals of Calvo and Candón-Mena (2023) and Valderrama Hernández (2013) for the

implementation of PAR with social cartography. These phases comprise: (a) an initial stage of diagnosis and research; (b) a phase of construction, conclusions, and proposals; and (c) a third stage of collective evaluation. This scheme allows us to understand both the map construction processes and the political, methodological, and communicative meanings that run through them. Figure 1 shows how, in the case of Mapa Verde, these instances were not strictly consecutive but rather an iterative process where the features of the map as a product were reviewed and adjusted.

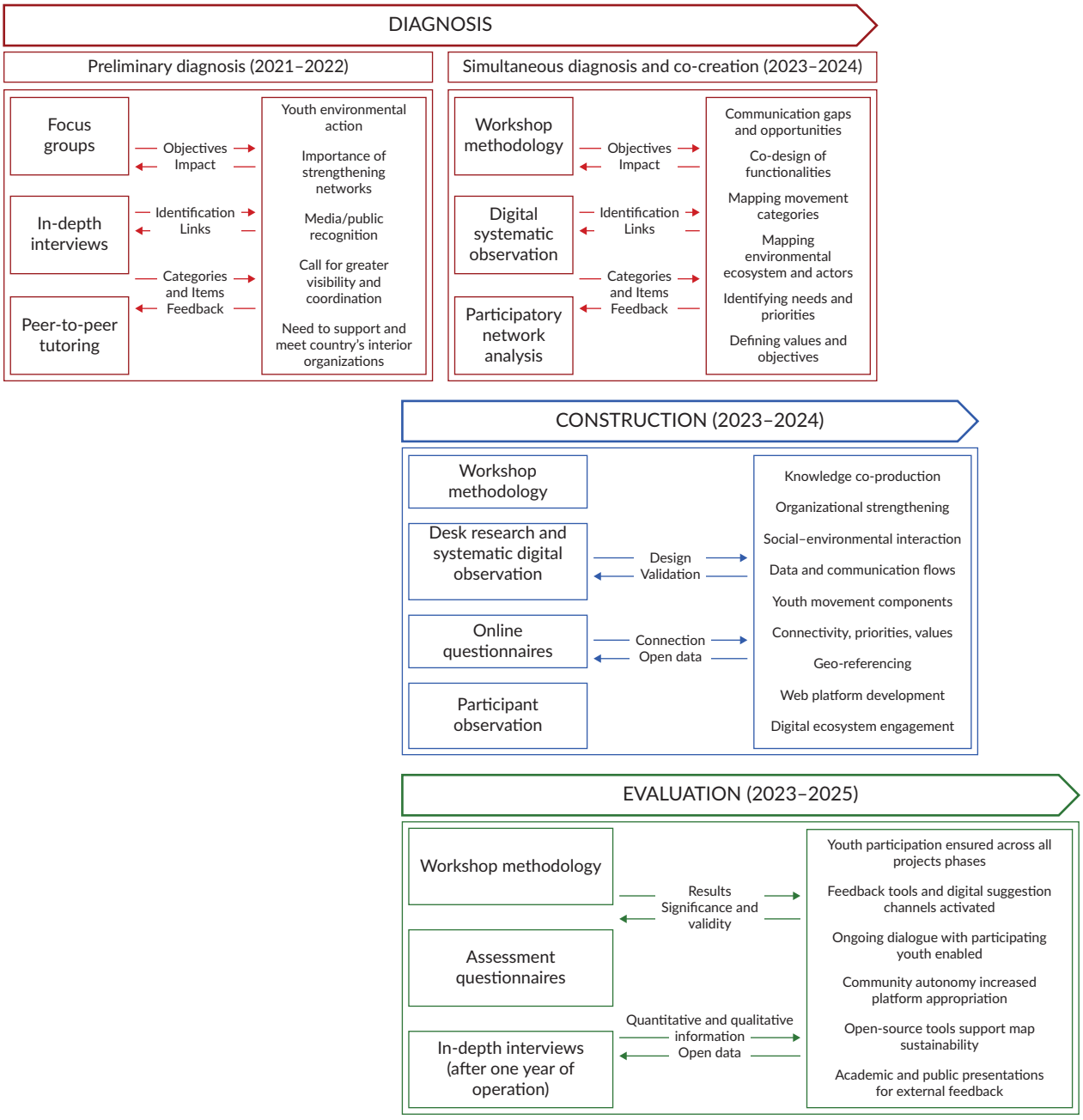

Figure 1. Phases of collaborative mapping in Mapa Verde. Source: Adapted from Calvo and Candón-Mena (2023).

2.1. Diagnosis

According to Calvo and Candón-Mena (2023, p. 32), the diagnostic phase "consists of the selection of the specific categories of the communities to be studied and the composition of the items included in each of them," according to the research interests and also the impact sought in the community studied (Stewart, 2010). From the dialogue between teachers, university students, and members of various youth initiatives that had already been working on environmental issues in the country, the need emerged for a platform that would allow these actions to be understood, connected, and enhanced. According to the principles of PAR, the phase articulates knowledge production and organizational strengthening.

Mapping environmental action that is both digital and territorially anchored enables multiple channels of dialogue between the academic research team and youth groups, as well as among the groups themselves. Face-to-face and virtual exchanges are central in Mapa Verde's participatory diagnosis phase. While these exchanges began in 2021, they intensified in 2023 with various methodological tools that allowed for a deeper understanding of the youth environmental movement in Uruguay, while also collaboratively designing the prototype of the digital platform. Thus, the participatory mapping assessment of Mapa Verde was not developed as a prerequisite to the platform's construction but was integrated simultaneously with platform co-creation processes, allowing for a dynamic interaction between research, participatory design, and collective validation.

2.1.1. Preliminary Diagnosis (2021–2022)

Regarding the intended impact on the community involved in the action-research project, the need and interest in mapping the youth environmental movement in Uruguay arose within an academic outreach exercise proposing peer-to-peer tutoring: representatives of youth environmental organizations and students from the Faculty of Communication, aiming to analyze and implement communication strategies for development (Gómez Márquez & Besada Paullier, 2024). In interviews and focus groups led by the research professors who designed the process, youth organizations expressed the need to better understand other youth organizations' environmental actions to strengthen networking:

> Knowledge is shared, and I think it's mutually beneficial to stay in touch. I didn't know the vast majority of them before this programme.
>
> We could complement each other with other groups. I think it's more than necessary; it would be good for all of us.
>
> It's important that larger organizations participate and provide support. It should be the joining of several things: the more theoretical organizations and those trying to act at the government level, the ones that can reach more municipalities.

They also highlighted the need to establish themselves as valid interlocutors for media and public institutions, providing key input for designing Mapa Verde as a platform for visibility and coordination. As a young activist emphasized, "The biggest goal is that we can bring together a larger audience; it's beneficial for all of us," while a member of a different organization specifically asked for support to be able to "talk with politicians, people

who are not peers." Interest in having a map and participating in its construction was unanimous among the eight participating organizations, selected from 15 applicants based on territorial and thematic diversity:

> I think it has a lot of potential, and it would help people a lot, because sometimes they search on social media, and you can't search specifically for environmental organizations on Instagram.
>
> A map is fantastic! Because mentally, it is how you think, the brain works that way. It could be done, for example, even with startups, so that people who want to be environmentalists can search for cosmetics, secondhand clothes, etc.
>
> I think it's a good idea, because networks are sometimes created, but they're internal, and creating one for external exposure is quite good. It would also help a lot with what we're doing and what we want to do. Knowing that there is a goal of achieving this final product would also help to prevent it being considered a waste of time.
>
> I love the idea. On the one hand, there's the advantage of virtuality, allowing us to learn about similar projects and, at the same time, complement each other. Knowing that there's a project doing something 20km away, we can complement each other. I think that's great. We recently met a startup that makes eco-bricks, and we stayed in touch, and they told us they didn't have anyone in Maldonado who could act as a collection point for eco-brick donations. Well, it was really close, so we received it at the high school, we have space, everything, and they pick it up. We were close, in terms of the thematic area, and they have professionals who know the subject, which is very useful for us. And, we found out by accident, but I think something like this that allows us to visualize projects with the same central theme in one place would be great.

The program evaluation also emphasized continuing to strengthen organizations' communication capacities to support these demands. This was later confirmed and expanded through training sessions with 20 other Uruguayan youth environmental organizations in another outreach project by the same research team, focused on providing communication tools to strengthen organizations in the country's interior.

The academic interest in producing knowledge about the Uruguayan youth environmental movement builds on previous research on youth, the environment, and communication conducted by the university coordinating the Mapa Verde project. The qualitative study comparing non-activist youth in Uruguay and Ireland regarding their perception of environmental issues, agency, sources of environmental information, and consumption of pro-environmental videos is the first milestone (Gómez, 2022; Gómez Márquez, 2024). This work shows that, while youth share globalized repertoires, thematic priorities and narratives about the environment differ significantly between the Global North and South (Gómez Márquez, 2024). This finding encourages the avoidance of generational generalizations based on studies from other latitudes. Focus groups with young people in Uruguayan environmental organizations, allowed comparison of their discourses with those of unorganized youth, revealing keys to social change strategies, environmental action, and communication forms adopted by youth activism (Gómez Márquez & Besada Paullier, 2022, 2024). Subsequent studies on narratives of local eco-influencers on the most popular youth social network Instagram (Garzón Díaz & Gómez Márquez, 2023) highlighted the need to consider entrepreneurships promoting green consumption as means of addressing the environmental crisis, aligned with international

trends in environmental activation through lifestyles. The analysis of Uruguayan discourses on environmental action on this social network also provided input for constructing the Mapa Verde digital ecosystem.

In 2022, renewed interest from youth organizations involved in the 2021 academic exercise led to the mapping proposal being reactivated. In response, the Faculty of Communications conducted exploratory research on the technical, communication, and social feasibility of a digital platform called Mapa Verde, investigating its main functions from the perspective of young, non-activist users. Together, this academia–third sector alliance designed a project that secured institutional support and funding for its participatory implementation during 2023 and 2024. The youth organizations promoting this initial co-design and fundraising stage were: Ecocity, created during the pandemic and focused on environmental education, based in two departments (north and center-south); Fridays for Future Uruguay, the local chapter of Greta Thunberg's international organization which operates mainly in the capital and southeast; and Movimiento Abeja, focused on local development in the southwest. These actors were key participants throughout the diagnostic process not only for the relevant information they provided but also for effectively creating the network of weaker ties with other youth initiatives necessary to complete the participatory mapping (Calvo & Candón-Mena, 2023; Postill & Pink, 2012).

2.1.2. Simultaneous Diagnosis and Co-Creation (2023–2024)

The mapping categories and items, based on research by the project's coordinating university, were outlined with the goal of promoting youth organizations and consulted with potential non-activist users in an earlier stage. They were finally defined participatorily in 2023, when Mapa Verde secured funding to expand and intensify activities for creating the digital platform https://mapaverde.uy. This involved three co-creation workshops focused on surveying the information and communication needs of young activists and interested non-activists—the two priority user groups—identifying relevant actors and understanding the youth environmental ecosystem, recognizing problems and opportunities in their communication with society, defining platform objectives and scope, and co-designing functionalities and the site's visual identity:

> I wanted to join as a volunteer in any environmental action. I searched for it and I couldn´t find anything anywhere. I googled it, I did research on Instagram, until I found Ecocity, but it was really hard for me to find the information.

> I feel that Mapa Verde appeared to facilitate the type of search that we had to do initially when we wanted to start doing something for the environment. We wouldn't find anything…in Mapa Verde, now you have all that you can access, seen from the perspective of other young people.

Various feedback mechanisms were designed and implemented so that, as pointed by Calvo and Candón-Mena (2023), "key participants know the specific items so they can raise doubts and identify incomplete categories, as well as possible biases in the map design" (p. 33). The three driving organizations of young environmentalists not only contributed their territorial experience and knowledge of the actors' ecosystem but also their strategic vision to guide platform content and objectives. They also consolidated as a Mapa Verde Advisory Council, consulted on all technological and political platform definitions as references for the broader community, testing a governance form that remains in place.

As a result, relevant items and categories for mapping the youth environmental movement in Uruguay were participatory. The agreed-upon map items are the various "youth environmental initiatives," categorized as independent non-profit organizations, circular economy, or conscious consumption-oriented ventures, networks, and volunteer spaces involving adult tutors. These items are also categorized according to: type of initiative, department where they operate, topics they work on, type of actions they undertake, how to contact them, volunteering opportunities, and activities uploaded to the website calendar.

From the perspective of contributing to strengthening the social movement, the workshops included a mapping of actors linked to environmental action, featuring institutions and organizations from the adult world with whom they worked or could work in a network around shared objectives or territories. Following the methodological proposal of Buckingham et al. (2018, p. 33) for mapping social landscapes, two approaches were developed in this instance: "Mapping Connectivity," to understand "network connectivity, or the degree to which individuals and organizations are connected"; and "Mapping Priorities and Values," used to "reveal the attitudes and cultural systems behind social networks."

In line with this proposal, the map construction strategy first addressed "mapping connectivity," applying participatory network analysis methodologies. The focus was on identifying relevant actors in environmental action in Uruguay (direct or indirect), understanding the functioning of the ecosystem, and identifying pain points/problems and opportunities in communication between environmental youth organizations and with society at large. After mapping the actors, the information/work/connection flows between them were identified.

Regarding "mapping priorities and values," the workshop sessions focused on identifying needs, priorities, and objectives shared by the participating stakeholders. The individual form, central to Buckingham et al.'s (2018) proposal, took on a secondary role to the workshop methodology which relied mostly on collective co-creation tasks. The discussions about priorities and values led to decisions regarding the design of the interactive map as well as the two complementary sections that would be part of the website: the calendar of activities and the resource repository. The values underlying the youths' environmental practices were observed and recorded, although they were not analyzed through a participatory approach in these sessions. Instead, they were added to the corpus of observations by the university research team.

The gaps in knowledge and experience observed among the young participants confirm the relevance of a platform that not only functions as an information repository for those outside the movement but also as a space for articulation, visibility, and exchange for youth committed to environmental action. In the evaluation of the workshops, predominant responses to the question of what was the main takeaway for young participants pointed to learning from peers: "To be able to exchange knowledge with other young people with the same interests"; "I found that it was crucial to give space to get to know what other organizations are doing"; "what I value most is the exchange between participants," "I feel that there is more conversation on these topics in Montevideo, but not that much in the interior of the country, where it's harder to find people involved in them." This identified gap in visibility and connection also highlights the contribution that academia could deepen through action research.

2.2. Construction (2023–2024)

The process of building the Mapa Verde platform was conceived from the outset as a co-creation experience, understood in the terms of Vargo et al. (2008) and Užienė and Stankutė (2015) as a collaborative dynamic in which multiple actors contribute to the creation of value. In total, more than 80 young people and 12 organizations with different profiles participated in these collective events. The first National Meeting of Youth Environmental Action in the country, which brought together 60 young people from different parts of the country, stood out as a milestone. In the field of social projects, the notion of co-creation implies the joint construction of knowledge, tools, and solutions, thus promoting social innovation and horizontal learning. In this case, co-creation encompassed both the technical and communication dimensions of the platform and the definition of its purposes, functionalities, and organizational structure, as outlined in the account of the diagnostic stage, which partially overlaps with the construction stage in Mapa Verde.

Figure 2. Photos during workshops in 2023 and 2024.

Connecting initiatives with external audiences, as a necessity that drives the process, guided decisions about how the mapping and the platform itself will be carried out. As Bryan (2015) warns, even in participatory processes, maps must adhere to conventions that grant them legitimacy in the eyes of external actors, which can lead to tensions with the specific logic of the participating groups:

> No matter how much participation lent legitimacy to the maps, their validity often remained subject to evaluation by judges, state officials, and other outside experts (Rambaldi et al., 2006; Sparke, 1998; Wood, 2010). The maps could challenge disciplinary boundaries and advance political causes, but they still had to be readable as maps. That requirement was more than just a matter of adhering to cartographic conventions. It meant fitting claims and participation into dominant understandings of

> the world, re-inscribing problematic distinctions between nature and culture, tradition and modernity. (Bryan, 2015, p. 253)

According to Calvo and Candón-Mena (2023), the construction phase proposes taking the categories and items prioritized in the diagnosis stage and adding them to a mapping software, enabling diverse communities to complement the information initially collected. In the case of Mapa Verde, throughout the co-creation workshops mentioned in Section 2.1, the diagnostic definitions were simultaneously uploaded to a pilot website. This allowed participants to view the shape that the Mapa Verde was taking, refine the diagnosis, and report the limitations of the resources available (or sustainable over time from a community management perspective).

In consultation with the Advisory Council, UNICEF, and the partner entity focused on civic technology (Data Uruguay), it was defined that Mapa Verde would be a platform based on free software and open data with publicly accessible information. The website allows georeferenced visualization of initiatives and their permanent updating through open forms, enabling any user to propose new organizations, events, or correct existing data. This follows Calvo and Candón-Mena's (2023, p. 33) recommendation to "consider the visualization of information (Perkins et al., 2009) but, at the same time, build a database that is open and can be permanently completed without the intervention of the researcher." Furthermore, the data are available for reuse as open data and the software code is free under the GPLv3 license. This approach allowed digital developments to be tailored to the project's needs and facilitated user adoption, especially by young people, who became active platform participants rather than mere information recipients. Complementarily, to connect with target audiences and attract visitors, profiles were created in commercial social media platforms as part of Mapa Verde's digital ecosystem (Instagram, Facebook, WhatsApp, LinkedIn).

In a second phase, with new changes incorporated into the mapping website and in early 2024, it was tested with a broader group from two user communities: young organized activists and youth interested in environmental action. This was done through in-person workshops at four strategic locations nationwide to facilitate territorial access. These meetings included participatory social mapping exercises identifying local environmental issues from youth perspectives while strengthening networking: a territorial survey (local and national) was conducted, locations with environmental concerns were identified, as well as youth environmental initiatives and problems in each area. Thus, as Buckingham et al. (2018) suggest, mapping physical or geographical elements merges with social mapping focused on human relationships and dynamics. This dual approach visualizes how physical and social environments interact, generating key data for community interventions and understanding communication flows. Although these representations were not directly incorporated into the platform's digital tool, they were fundamental for understanding youth perceptions of their territories, the environmental challenges that they prioritized, and the actors that were relevant for them. These maps, generated collectively on paper with stationery as part of the hybrid map of Uruguay's youth environmental movement, contributed to the recognition of the environmental landscape from a situated youthful perspective and the strengthening of links between physical and social issues.

Consultations with other qualified informants complemented efforts to identify youth initiatives to include in the map. In this multisectoral and multigenerational effort, other civil society actors (such as Civil Society Mapping, Wikimedia), educational centers (secondary and university), multilateral organizations (United Nations International Children's Emergency Fund, United Nations Development Program), and public

institutions (Ministry of Environment and National Youth Institute) participated by providing information and contacts.

By April 2024, the construction phase of the Mapa Verde was considered complete, meaning that sufficient data had been collected and verified to present the platform to the public. In line with Calvo and Candón-Mena (2023) and Stewart (2010), the guiding questions for drawing this line were: Does the map accurately represent the reality of Uruguay's youth environmental movement? And have communities integrated and expressed themselves in it? The answer was mostly yes. And, according to the Advisory Youth Council and institutional allies, making the map public would allow this task to be completed.

2.3. Evaluation

The evaluation, as Calvo and Candón-Mena (2023, p. 34) indicate, is the last phase of the mapping process and "consists of evaluating the information collected from the communities, in order to present the results, identify their possible limitations and reflect on the conclusions drawn from the data obtained." In the case of Mapa Verde, it was carried out at two levels. First, prior to the launch, meetings were held in the shared governance space with the Advisory Council, which was made up of the three youth organizations promoting the project and the main technical partner (UNICEF). Secondly, at the time of the platform launch, a broader group of organized and unorganized young people was convened at a National Meeting on Youth Environmental Action, which included but was not limited to those who had participated in previous co-creation instances. Thus, it aligns with Calvo and Candón-Mena's (2023) proposal to work with key participants and other community members through active group interviews. In these instances, "the mapping, with its data, is exposed to understand the opinion that communities have about them and how they interpret them" (Calvo & Candón-Mena, 2023, p. 34), as a deliberative forum (Cuesta et al., 2008) but with spontaneous dialogues about the representation on the map of the movement of which they are part, enabling a self-diagnosis and the search for improvement strategies (Park, 1992).

Additionally, one year after the platform's launch, a series of 15 in-depth interviews was conducted in partnership with Wikimedistas Uruguay to evaluate the use, meaning, and impact of Mapa Verde from the perspective of young members of the initiatives mapped in Mapa Verde.

The collaborative project development, the specific co-creation instances, and the platform's collective validation, piloting, and testing—along with recurrent meeting and exchange spaces—helped to foster meaningful appropriation by youth, both those with initiatives mapped on the platform and those not yet included. A member of the Youth Advisory Council explains:

> It's not just a map. Maybe it's the same challenge as every time we have to explain that the Movimiento Abeja isn't just about bees. Well, the Mapa Verde isn't just a map. I think the entire process behind building a community, generating exchanges and synergy between groups, looking for the training aspect…I think all of that is an added value that isn't just a map, it's not just a document.

A 14-year-old participant from one of the mapped initiatives expressed:

> I don't think that a map created with less participation would be the same; it wouldn't have meant the same. I mean, maybe the same projects could be on the map, but in the way it was created now, the

> projects are more closely associated with Mapa Verde. We know it more. We liked it more because we interacted a bit….If they had only said "your project will be in the map," we would have been like, "oh, well, just another project," but we wouldn't have been as aware of what it is and we wouldn't have liked it as much because it wouldn't have been as fun.

These efforts led evaluation instances to confirm that the map reflects their interests, languages, and needs. This fulfills Calvo and Candón-Mena's (2023, p. 36) premise that: "the appropriation of the map is greater the more autonomy the community has over its construction, and thus, in addition, the risk of the results being far from their interests and models is minimized." Furthermore, evaluations of the finished platform reflected the joint diagnostic analysis of the limitations that participatory technologies imposed on the visual result and user experience.

Despite the progress made, the Mapa Verde process has not been without challenges and limitations. One of these is the risk of replicating dynamics of exclusion, where some groups may feel marginalized or underrepresented, while others experience ownership or control of the process. As Chambers (2006, p. 6) warns, participatory methodologies can face tensions between the "marginalization of some, and mastery, pride, and ownership experienced by others." From the project's design, efforts were made to mitigate these asymmetries through open verification protocols, periodic instances of collective review, and horizontal decision-making spaces. However, this is a dimension that requires ongoing attention, especially in a context where youth are a diverse, constantly changing group—and not exempt from educational and social inequalities.

Likewise, it is assessed that the dynamism of the youth environmental movement in Uruguay in terms of the activation and deactivation of collective initiatives dictates the need to conceive of continuous participatory mapping as an observatory. As one of the young activists belonging to the consultation council expresses: "Mapa Verde is something alive, it's not something that's closed and that's it, it's something that's being built every day, and I think that's important." The dynamic nature of Mapa Verde means that its evaluation is not limited to specific moments, but rather constitutes an open and ongoing process. To this end, feedback forms, ongoing consultation spaces, and digital channels for suggestions have been enabled and disseminated through the digital ecosystem composed of various social media platforms, allowing for an active dialogue with participating youth. In this sense, the use of open technologies such as open source code or participatory forms reinforces this paradigm shift in which communities can not only create their own maps but also keep them alive.

The presentation of Mapa Verde in academic, community, and institutional settings has also gathered useful feedback. Preliminary results have been presented since 2024 at international conferences and seminars: International Conference on Communication and Applied Technologies (Lima, Peru); Congress of the Centre for Media and Society Studies (Buenos Aires, Argentina); World Association for Public Opinion Research (Florianópolis, Brazil); and the Environmental Communication Seminar-Symposium (Lansing, US). A technical report (working paper) systematizing the experience is being prepared to further disseminate methodological and research findings in Spanish. Dissemination has also reached broader audiences through workshops and fairs for youth, organized by educational centers, public institutions, and multilateral organizations, along with national media coverage. Social innovation, sustainable processes, and empirical insights of the young environmental movements were the most valued attributes of Mapa Verde as an action research project.

Overall, the continuous evaluation of Mapa Verde serves the threefold purpose of ensuring full youth participation in all phases of the process, fostering collective learning, and making ongoing improvements to the platform and the processes associated with its creation, maintenance, and updating.

3. Technopolitics and Counter-Data Mapping

The appropriation of digital tools by social movements has fostered technopolitical practices that transcend conventional uses of technology for communication and information exchange. The notion of technopolitics, defined as the "tactical and strategic use of digital tools for organization, communication, and collective action" (Toret, 2013, p. 20), helps explain how certain actors actively produce alternative narratives that challenge hegemonic meanings of territory, data, and power.

An analysis of the interviews conducted with 22 members of youth environmental initiatives that are part of Mapa Verde shows that, although these organizations actively use digital media to disseminate their actions and messages, they do not perceive themselves as actors of media activism in the classical sense. The autonomous creation of alternative media or the intentional use of communication tools to challenge dominant narratives (Jeppesen & Sartoretto, 2023) is not central in their discourse. On the contrary, their connection with the media responds, to a large extent, to specific operational and communication needs channeled through mainstream digital platforms.

Furthermore, in the case of Mapa Verde, the process of online visibility and the more sustained use of digital platforms arises in conjunction with a project promoted by the university, which reinforces a logic of appropriation rather than a case of self-managed media. This allows us to think of their practice more as a form of community communication supported by institutions than as autonomous media activism. Nevertheless, these experiences do reveal a latent political potential in the way they construct collective narratives, generate collaborative networks, and position youth environmental action in the public sphere, even without explicit strategic planning in terms of communication.

In his article, Bryan (2015) poses a fundamental question: Who makes the maps? This question runs through the diagnostic, construction, and collaborative evaluation phase of Mapa Verde where the design carried out by the research team in consultation with the youth council prioritizes the role of youth in the cartography of the environmental movement, traditionally absent from processes of territorial representation. In this sense, young people position themselves as the axis and co-creators of the map, in an exercise of visibility and affirmation of their existence and environmental action, which broadens the narrative about environmental action in the country by incorporating their voices and experiences.

In the Uruguayan context, precedents exist of mapping social organizations (Mapeo de la Sociedad Civil, n.d.) and environmental projects like the Small Grants Program (Programa Pequeñas Donaciones del FMAM, n.d.) that, while valuable for systematizing civil society environmental action, differ substantially from Mapa Verde's participatory, youth-oriented approach. The Online Civil Society Mapping, supported by various Uruguayan civil society actors, collects and organizes NGO information by work area and location. This directory classifies organizations by areas such as "environment and natural resources," identifying groups dedicated to environmental issues; however, only two of the youth groups identified by Mapa Verde is included there. Its format is not strictly cartographic, as it presents data in a searchable database rather than

an interactive map. In 2021, a young member of an environmental organization celebrated the idea of what was later developed as Mapa Verde, by contrast with the existing map:

> Tremendous! I find it beautiful, incredible. So necessary, so useful, so valuable. Recently, I had to map organized civil society for some activities in Laguna Merín, and there's a website for civil society organizations. Yeah, it was good. I used it, but it was very analog. I didn't really understand where they were located; there weren't many photos, and the social media wasn't there. And I jotted them down, but I couldn't make contact. Having an accessible map seems really good to me. If you go anywhere in the area, you have to work with the people who are there.

Another related experience is the Small Grants Program Project Map, a Global Environment Facility initiative implemented by United Nations Development Program in Uruguay since 2005 and currently coordinated by the Ministry of Environment with participation of the Ministry of Tourism. This cumulative map uses Google Maps to show the territorial distribution of over 180 projects by 325 community organizations across 19 departments from 2005 to 2023, whether finished or ongoing. Although it offers an updated visual tool, it is an institutional registry of internationally funded projects, lacking a participatory methodology or specific focus on youth initiatives—though youth leadership has been a strong action line of the Small Grants Program in the past year.

In both cases, while its platforms play an important role in providing access to environmental or social information, their data production logic differs from participatory social cartographies and most initiatives mapped in Mapa Verde were excluded due to focus or selection criteria. These experiences do not arise from dialogue, co-creation, or PAR, but are limited to collecting and organizing information from a traditional, centralized perspective. This methodological difference is key to understanding the distinct value of a cartography collectively constructed from, by, and for youth involved in environmental action. As Pánek (2016) notes, maps created by state agencies or experts are giving way to those developed by citizens, with information users actively participating in their construction.

Beyond the central role of a group struggling to gain visibility and control the narrative, it's worth asking whether this participatory cartography corresponds to a process of counter-data mapping. To the extent that it challenges hegemonic structures of representation and makes visible historically marginalized territories and social actors, it could be argued that it does.

However, when interviewed in 2025, most youth initiatives in Mapa Verde did not identify it as a "counter-mapping" tool in the strict sense, but as a strategy enabling visibility, strengthening, and connection of emerging actors in the youth environmental ecosystem. As one member of a mapped initiative explains:

> Even though we didn't have new people coming to us because of seeing us on Mapa Verde, when we tell people that we are part of the platform, we see how it has an effect. The map gives us like a validation that we are really a green entrepreneurship, because it is a map where all the green organizations are. It is the kind of validation that we often need.

As Williamson and Connolly (2011) already pointed out, mapping—in this case, digital—becomes in itself a communicative act that not only articulates data but also facilitates open access to knowledge and favors

collective learning processes, an element highlighted by several of the initiatives interviewed. Some of them emphasise that the process helped to provide and share information as well as to learn about new relevant content; others highlight the value of having a space for exchange about current events (especially in meetings or workshops), which keeps the issue on the agenda. The possibility of learning about other youth initiatives in the territory, the actions they carry out, and how they relate to similar challenges was also highlighted:

> It opened our eyes. It was like, 'Look, there's a whole range of possibilities,' because we said, 'Oh, look at all the organisations that are like us,' and we had no idea they existed. So we know that [Mapa Verde] is also a source of information for us: to be able to access partnerships, for example, if we want to do so. Or, I don't know, some specific activity or promote one, such as a beach clean-up. It's a place where we can find information on who to invite or who to partner with for these issues.

From this view, the territorial co-creation process is as relevant as the final product: Many organizations noted that participating strengthened their public positioning, generated new alliances, or boosted integration into broader networks. As Jeppesen and Sartoretto (2023) argue, digital activism and community communication increasingly interconnect in actions prioritizing the relational, situated, and collaborative, beyond traditional protest or militancy repertoires. The Mapa Verde platform thus becomes a communication hub facilitating connections among diverse experiences, promoting critical environmental reading, and fostering the social appropriation of digital tools.

From the perspective of its protagonists, the reasons for becoming involved reveal a slightly stronger focus on connecting with other initiatives than with audiences outside the youth environmental movement, aligning with the predominant imagery in Jeppesen and Sartoretto's case studies on counter data mapping. This spatial-relational imagery values mapping's ability to reveal and revalue community relationships (Jeppesen & Sartoretto, 2023, p. 155). This view reemerges in interviews conducted one year after the platform's launch despite the map not visualizing connections between youth environmental initiatives. Likely, this spatial-relational approach—as Jeppesen and Sartoretto assert—goes beyond organizing information; it alludes to how the process generates a sense of community and shared narratives.

4. Conclusion: A Tool and a Process for Environmental Advocacy

Currently, Mapa Verde is a digital platform under ongoing collective construction, resulting from a participatory process with periodic review, validation, and improvement of its tools and criteria including a protocol for updating and verifying initiatives and information. These processes transform the tool into a collaborative, living observatory capable of capturing changes in Uruguay's youth socio-environmental ecosystem.

By using mapping as a form of communication (Williamson & Connolly, 2011), Mapa Verde contributes to the visibility of the mapped initiatives and boosts their work in external communication, including with other initiatives. Furthermore, the platform and its digital ecosystem organize their messages around key themes such as the SDGs and the identification of areas of work for youth initiatives, creating a thematic cartography (Buckingham et al., 2018) that identifies priority environmental issues for this population. Daly (2008) highlights that social mapping helps unravel structures and relationships within civil society, contributing to public policy formulation and strengthening citizen participation. This analysis contextualizes social action within specific environments, allowing responses adapted to local needs in dialogue with the

national sphere. Thus, Mapa Verde aims to strengthen the visibility, impact, and coordination of environmental youth while promoting a participatory, situated, and transformative cartographic culture.

The Mapa Verde platform was conceived and co-created as a connecting tool among youth committed to the environment and other social, institutional, and community actors interested in strengthening environmental action in Uruguay. Beyond being a consultation tool, its design and use promote a situated understanding of the territory, recognition of diverse knowledge, and network construction to enhance collective action. It echoes Williamson and Connolly (2011, p. 97) who highlight that these developments enable "a more reflective reading, viewing, and understanding of one's environment and facilitate the recording, as well as the protection of traditional knowledge and communal experience of space." Therefore, Mapa Verde is a pedagogical and political tool: It represents initiatives and issues while fostering learning, territorial appropriation, and coordination.

In line with the Development Communication and Social Change principles (Acunzo et al., 2016), Mapa Verde uses its digital ecosystem as a space for co-creating messages that promote sustainability and give visibility to youth voices. This strategy connects with the concept of environmental advocacy (Pezzullo, 2020), where communication not only informs but also empowers young people to act on critical environmental issues, achieving social change from a bottom-up perspective. Furthermore, training processes, both within academia and among peers, strengthen the youth movement, not only in its communication skills but also in its organizational skills.

In a way, Mapa Verde helps rethink the scenarios of youth environmental action, their own practices, and imagine new forms of environmental activism. Both the platform and the Mapa Verde co-creation process configure a hybrid map that links geographic space with the digital environment where youth environmental initiatives operate. In such experiences, it is impossible to separate the physical and georeferenced space—key to environmental issues—from the digital realm, where delocalized activism on global issues like climate change, water management, energy transition, and responsible consumption takes place.

This type of exercise aligns with the notion of countermapping, understood as an emancipatory practice of representation and symbolic and political dispute over territory and data (Jeppesen & Sartoretto, 2023). In this sense, the platform enables a new scenario where youth not only communicate but also reconfigure the sociopolitical landscape of environmental action through their own imaginaries, practices, and community ties.

As Pánek (2016) states, "the process of mapping is as important as the result of the mapping activity" (p. 304). In Mapa Verde's case, this involved designing an open, collaborative system where the map and the supplementary sections of the website (calendar and resource repository) resulted from a dialogic construction between youth and technical, academic, and institutional actors. In line with the distinction proposed by Chambers (2006) between spaces "to which one is invited" and spaces "that are claimed," Uruguayan environmental youth are deploying their actions at both levels: inserting themselves into institutional participation devices, but also generating and co-governing their own platforms for visibility and connection, such as Mapa Verde:

> "Spaces" is now widely used in a largely, though not entirely, metaphorical sense in discussions of participation and power, distinguishing spaces to which people are invited from those that people

> claim. Power and relationships, and individual behavior and attitudes, have continued to move from the radical wings closer to center stage in the discourse and practice of participation and of development more generally. (Chambers, 2006, p. 2)

From a critical perspective, Bryan (2015) emphasizes that maps should be seen as cultural and political tools capable of reconfiguring how power is represented and exercised in space. Along these lines, maps not only inform but also interpellate, mobilize, and influence.

Thus, mapping should be understood as a social practice that rethinks the role of maps in political ecology, as well as situated expressions of knowledge, identities, and territorial disputes, which can generate new forms of politics and collective life. As Bryan (2015, p. 257) points out:

> Attention to the production and use of maps dispenses with empty calls for participation, and instead asks whose knowledge counts when it comes to questions of space and power.

Participatory mapping is consolidating as a tool in social change communication, one that generates knowledge about a complex social reality, such as the youth environmental movement. The Mapa Verde platform facilitates a social cartography (Buckingham et al., 2018) that connects youth initiatives and organizations, and reflects the dynamics of civil society (Daly, 2008) around environmental action. The dynamism of this reality, however, requires that systems be established to enable the continuous monitoring and strengthening of the community generated around Mapa Verde.

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Conflict of Interests

The authors declare no conflict of interest.

Data Availability

The data used in this study is available through the following Mapa Verde's open links: https://mapaverde.uy; https://www.instagram.com/mapaverdeuy (Instagram); https://www.linkedin.com/company/mapaverdeuy?originalSubdomain=uy (LinkedIn); https://facebook.com/mapaverdeuy/?_rdc=1&_rdr (Facebook).

LLMs Disclosure

For transparency, ethics, and academic integrity, we inform that AI tools were used to a limited extent during writing and analysis, under constant human supervision. ChatGPT (OpenAI) assisted in reviewing the style, wording, and grammatical consistency of some interview quotations originally in Spanish, as well as in

revising reference formats per APA (7th edition). Google NL Notebook was used for reviewing textual citations. Automatic translators (Google Translate and DeepL) supported manuscript translation into English, with subsequent author review. Finally, AI features in Atlas.ti software aided coding and qualitative analysis, always interpreted and validated by the research team.

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About the Authors

Victoria Gómez Márquez has a PhD in communication (Dublin City University), a BA in communication, and an MA in social policies and community mediation (Universitat de Barcelona and Universitat Autònoma de Barcelona). She is the research director at the Faculty of Communication (University of Montevideo) and her research areas include environmental communication, communication for development, and educommunication.

Carolina Garzón Díaz has an MA in communication management from Universidad de Montevideo, a BA in social communication from Universidad Central de Colombia, and a postgraduate diploma in digital communication from FLACSO-Uruguay. She is a PhD candidate in social communication at Universidad Austral and is a professor and researcher at the University of Montevideo. Her research focuses on environmental communication and educommunication.

Tatiana Oviedo Curbelo has a BA in communication from Universidad de Montevideo. She trained in leadership and is currently studying cultural management. She is the founder of an anti-human trafficking initiative, a member of the Youth Network for Climate Justice, and she specializes in communication, social engagement, and audiovisual content production.