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Community mapping based on Milton Santos as a tool for disaster response and risk management in self-built communities: case study of El Pacífico, Medellín, Colombia

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ABSTRACT

This paper aims to showcase the community mapping process that took place in the *El Pacífico* neighborhood in the city of *Medellín*, Colombia, which runs alongside the urban-rural border of the high slope of the city's *Comuna 8*. The geographical and socio-economic challenges that the community has historically faced have come to light throughout the years in the form of geological hazards and disasters that have led to the destruction of several buildings in the neighborhood, threatening the community's permanence.

As these scenarios intensified, the community sought to participate in research projects with both local and international partners to better understand how to improve their disaster risk management practices. URBE Latam, which is one of these experiences, has been working to improve the neighborhood's data generation practices, adopting the territorial definitions proposed by Milton Santos in *Espaço e Método*, coupled with participatory mapping strategies for disaster risk reduction during a three-year period. This has resulted in the mapping of *El Pacífico* and the improvement of the local grassroots organization's territorial management practices. These maps have served as tools for the community's empowerment when dealing with public institutions, as well as for planning and managing their own territorial agendas for the future.

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Main text introduction: Self-constructed communities living on the edge of the planned territory

In Latin America, situations derived from poverty and social inequity have encouraged the development of neighborhoods and urban-popular scenarios that manifest themselves outside the traditional formal planning schemes of the city (Delgadillo, 2016; Janoschka & Casgrain, 2013; Perlman & Delgadillo, 2019). This translates into the creation of territories that are not perceived by governments as “legal” or “regulated”, and which are thus unable to exercise their rights to access specific benefits and services available to other neighborhoods. More specifically, in Colombia, the internal armed conflict has served as a catalyst for the socioeconomic, political, and cultural problems that have triggered these settlements within cities (Sánchez Steiner, 2008; Pérez Fonseca, 2018).

In other words, the war that has existed throughout the national territory since the mid-20th century has directly influenced how urban environments have been configured. Forced displacement – one of the most characteristic elements of the conflict that caused around eight million Colombians to be

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displaced between 1985 and 2019 (Comisión de la Verdad, 2022) –, led to the arrival of new inhabitants in the cities, who came seeking aid as a result of the violation of their rights (Aristizábal Botero et al., 2018).

Without institutional support and unable to return to their homes in rural areas due to the armed conflict, these residents often had to relocate to the most accessible areas for the construction of popular housing within the cities they arrived at (Aristizábal Botero et al., 2018; Pérez Fonseca, 2018). Depending on the local topography, this may be in the vicinity of the rivers that crossed the urban centers, in the urban peripheries, or on the high slopes. The latter was one of the scenarios that received the most displaced population in the specific case of the city of Medellín, hence leading to the construction of multiple barely legal settlements along the urban-rural border of the eastern and western hill-sides (López & López, 2004; Osorno Vanegas et al., 2014; Pérez, 2018).

These barely legal settlements face the challenge of formally proving their existence to others by the legitimacy of their territorial organization. As such, it can be said that they exist somewhere across the line of what Honneth (1997) defined as the philosophy of social recognition. As a social group, their public agendas are defined by their struggles in securing the needs to live comfortably by their own standards; however, they cannot easily access the elements that could cover those needs without government aid (such as public utilities, public and housing infrastructure, risk reduction measures, etc.).

Consequently, social agendas become political matters that must be resolved by questioning the logic with which the public institutions act, at least in this case, on a municipal scale. This demands the attention of those that have previously looked at these communities with disdain from an opposing view. One of the ever-recurring challenges for self-constructed territories lies in the invisibility of communities in official plans and maps made by the municipality.

In the case of *El Pacífico* (See Figure 1, the neighborhood's border was defined by the community) they have not been formally recognized as a neighborhood. The URBE Latam project (Understanding Risks & Building Enhanced Capabilities in Latin American cities, henceforth UL) sought to directly contribute to this issue by recalibrating risk mapping through citizen generated data.

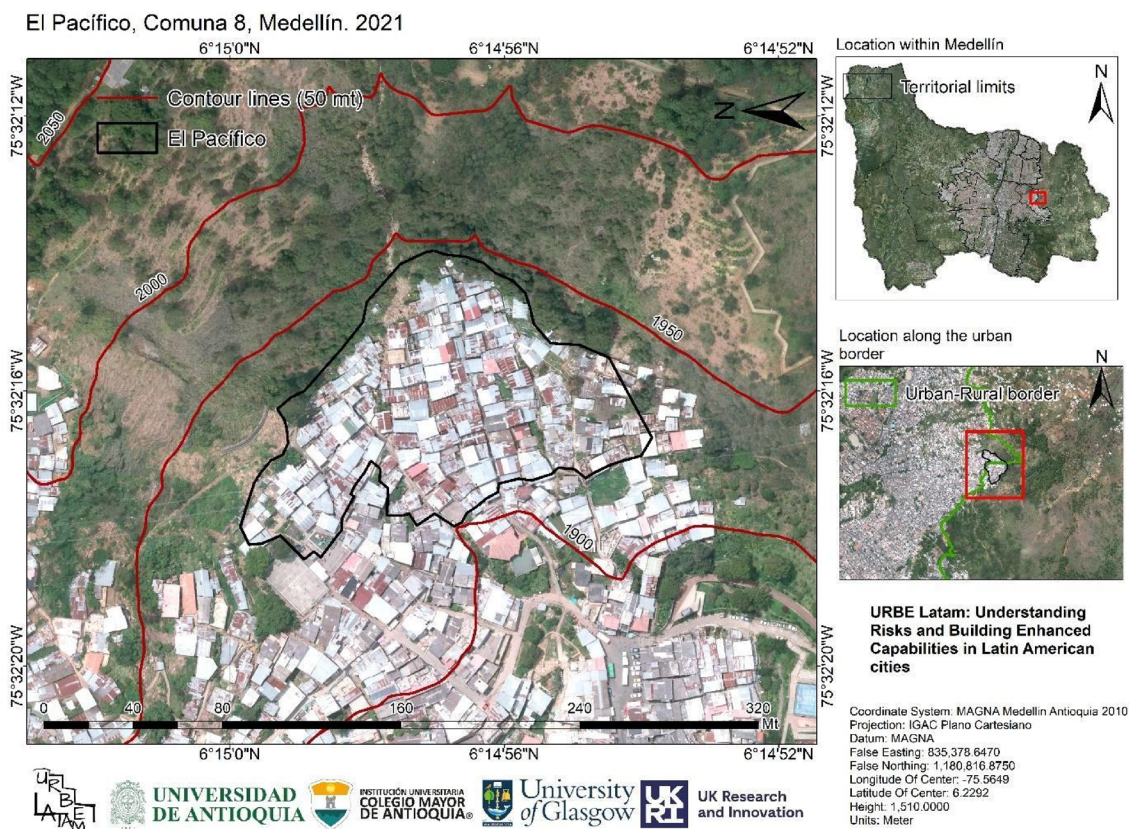


Figure 1. General location of *El Pacífico* in Medellín. Source: UL.

Although Medellín has been experiencing a positive trend in public interventions, mainly in the form of public transportation infrastructure in communities located on the slopes over the edge of the city (Amar Flórez, 2016; Bocarejo et al., 2014), these communities face many issues, including difficulties to access other services such as running water and healthcare, and live under the hazards imposed by their location in high slopes prone to landslides, torrential avenues and rockfalls (Coupé, 2011; Rivera Flórez et al., 2020), (See Figure 2, where the withdrawal zone of the local creek functions as a flood-prone area).

These communities have been characterized by emerging from popular self-construction processes, often without any kind of government support or regulation, and their goal is to provide their residents with a habitable place where they can build what they consider a decent living (Moreno & Rivera, 2022). Given the conditions, these territories fight for both their permanence and the acquisition of residential public services, such as drinking water and electricity, against public institutions that label them as “illegal”, “informal”, or, in the worst case, “invaders”.

Thus, our objective is to showcase *El Pacífico*'s community mapping process as part of the UL project, as a way to face the previously established problems. To do this, we opted to explore an important critical geography referent in Milton Santos (1997) whose theory we think can be expanded in a methodological attempt to interlink formal research, mapping software and platforms, and participatory mapping to offer sensible solutions to complex urban issues.

Materials and methods: Community mapping based on Milton Santos: a response in barely legal settlements

Despite being an important theoretical reference, Milton Santos' work is often associated with the more epistemic side of critical geography, instead of delving into the empirical possibilities that his ideas may enable. Recent studies on the subject offer powerful reflections in regards to topics such as decolonization in the Global South (Halvorsen & Zaragocin, 2021), the disputes for space through the appropriation

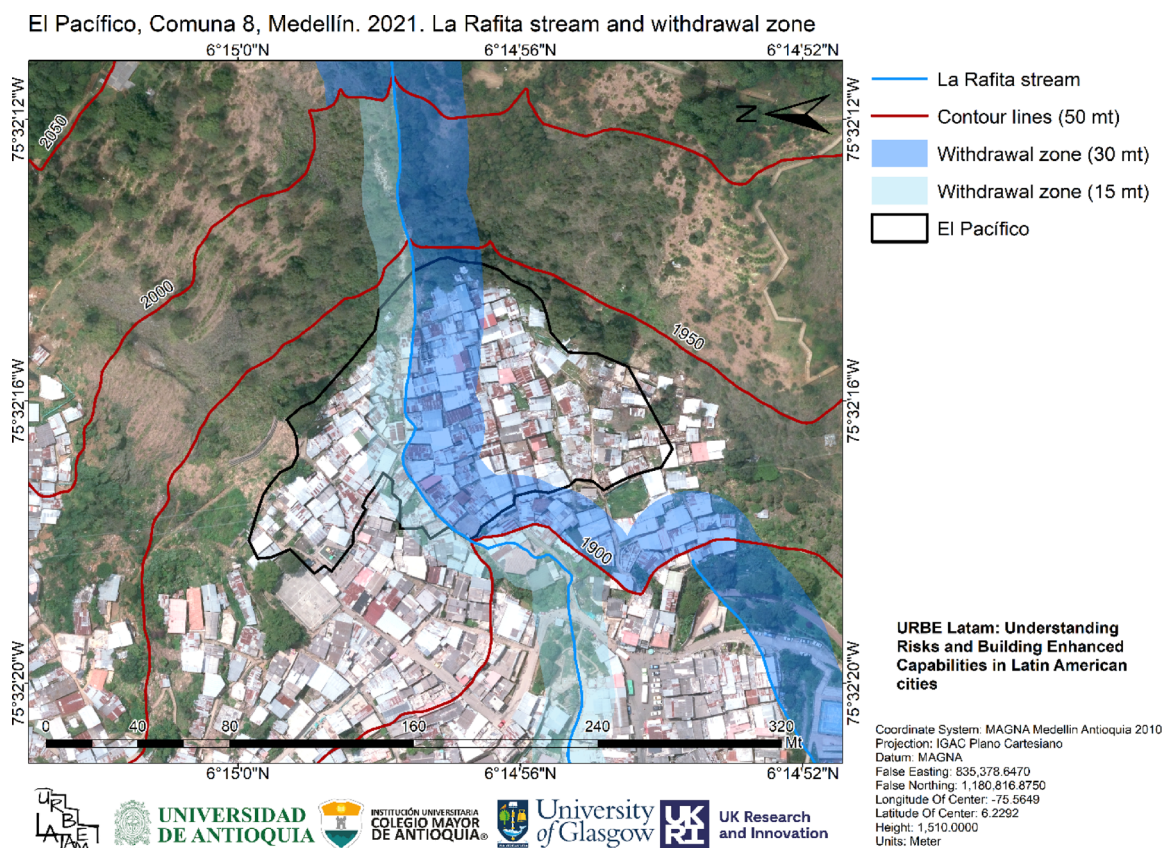


Figure 2. La Rafita stream within *El Pacífico*. Source: UL.

of the law by marginalized resistance groups in cities (Rizzini Ansari & Amadeo, 2022), and more recently, social justice in urban peripheries (Doherty, 2023).

However, scarce literature has been found in recent years when it comes to advancing Santos' work in a more practical approach, though attempts have been made in the past, as shown by Lopez and Kuc (2009). Hence, the following section seeks to recontextualize some of his work, particularly that of his conceptualization of territory, and explore a possible way to represent this, specifically in the field of disaster risk management. In this regard, the link between mapping practices and disaster risk management is not lost in recent literature (Tzavella et al., 2022; Wojciech et al., 2022); however, more inclusive and sensible approaches are still needed in order to better counter socio-spatial injustices.

Geographical information is a powerful tool to plan and manage a territory, therefore local administrators must have both the duty and the means to produce the cadastral cartography to define how the land is occupied, how much of it is being used, and for what purposes. But so-called "informal" settlements fall outside the city boundaries defined by the maps produced by the municipality. This situation means that rather than being passive, vulnerable actors, communities face the challenge of building their own geographical data, ideally through improved capacities to develop map-use strategies (Di Gessa et al., 2008) with the aim of measuring, representing and analyzing more reliably their spatial information based on their own perception (Barrera, 2009).

To aid a particular territory on this issue, UL worked between late 2019 and early 2023, with the community of *El Pacífico*. During this time, the research carried out followed a Freirean approach (Freire, 2018), meaning that, working from a dialogic and participatory perspective, the community's input and direction were vital to producing socially sensible and relevant data that could be used to enhance *El Pacífico's* territorial practices. On a more specific level and given the project's aim in relation to risk management, it was necessary to define a methodological approach that could be used with this sort of general approach.

The dialogic approach of UL involved the community leaders as part of the research team, thus giving their voice weight not only to set the goals of the research but in the analysis and further use of results, addressing in this way one of the shortcomings found in traditional participatory mapping schemes (Laituri et al., 2023). Thus, we opted to adopt Milton Santos' (1997) proposal on how to analyze territorial context and construct critical maps. This, however, posed a challenge that we hoped to resolve; although Milton Santos did not directly address the issue of risk management throughout his work, we aimed to place one of his analytical proposals at the center of a disaster risk management mapping experience.

Santos (1997) recognizes the complexity of human-inhabited spaces and the importance of understanding its elements from a grassroots perspective to produce maps that rethink and repurpose traditional cartography to serve a specifically sensible goal. He suggests that four definitions determine a territory: form, function, process, and structure. A visual representation of how these elements coexist and relate to one another within a territory can be seen in Figure 3. These elements can be summarized as follows:

1. **Form:** It refers to the visual aspect of something. Here, elements such as scenery, construction style, iconography, or other relevant, often visually striking items are present in any given locale.
2. **Function:** The individual activities that can take place within a territory. These are primarily related to the daily routines of its inhabitants concerning work, organization, cultural practices, etc.
3. **Process:** The sum of actions that are aimed at a specific goal within a territory. It is directly related to projections that go beyond the daily routines of its inhabitants by focusing on a long-term desire shared among the people who identify as part of a specific place. It is relatively similar to the mainstream definition of collective actions suggested by Torres Carrillo (2006).
4. **Structure:** The interrelationship between all the above elements forms the structure, which is akin to the "whole" of any given socially constructed space. The concept of structure is comparable to the concept of territoriality by Sosa (2012), Renaud (2015), and Escobar (2014).

Taking the above elements into account, as well as the general Freirean approach (Freire, 2018) adopted by UL, it was crucial for us to understand which of these elements were relevant for the community, while also having the opportunity to co-define the data variables that would determine the

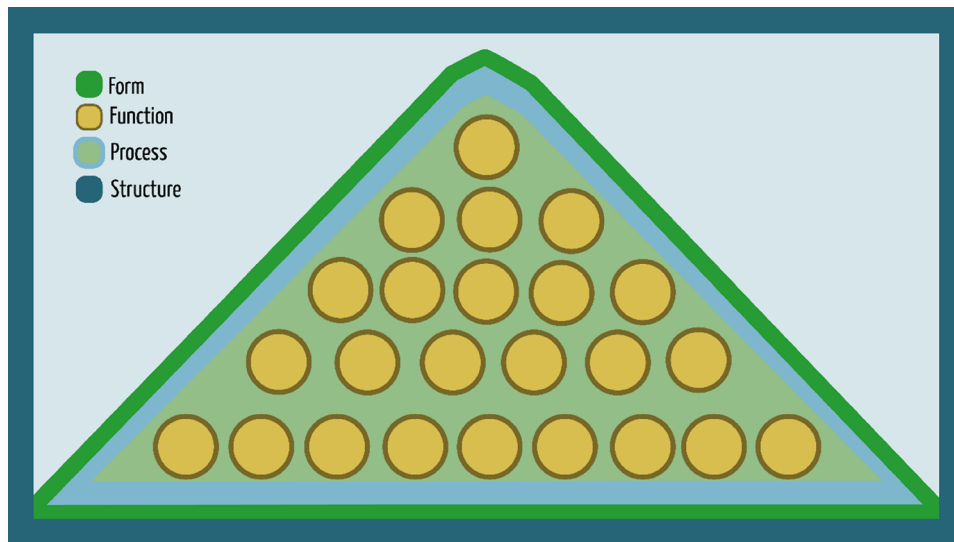


Figure 3. Visual representation of Santos' (1997) definitions of territory. Source: UL.

ongoing mapping exercises that would take place between 2019 and 2022. To pursue this avenue, short non-structured interviews, which centered around four main questions, were conducted with several community leaders:

- A. What comes to mind when one of the definitions is mentioned?
- B. Have any data been produced in relation to these definitions?
- C. If any data have been produced, have these data been mapped?
- D. If no data have been produced, should these data be mapped?

These interviews were conducted individually and separately, usually within other activities that would take part in the neighborhood, such as tours or community meetings. No academic language was used to transmit these terms, nor was it explained to the community leaders who Milton Santos was or what his spatial theory was about². The questions were phrased in common, easy to understand and engaging dialogue, such as (for example) *"What comes to mind when you think about the Form of El Pacifico?"* or *"What would you say is the Form of this place?"*, which they would associate with the aesthetic of the buildings, the shape and materials of the houses, the panoramic view of the zinc rooftops, etc., or *"Have you ever seen any maps that represent the Function of the neighborhood?"*, to which they would wonder about how it would be possible to map actions such as a census.

The resulting methodological framework (Figure 3) allowed us to consider which definitions, based on the territorial forces proposed by Santos (1997), could be pursued through an ongoing mapping exercise spanning a three-year period. Three community leaders were interviewed, whose responses are summarized in Figure 4.

Unlike traditional participatory disaster risk mapping, where researchers are interested in the location or perception of hazards (Kienberger, 2014; Ruin et al., 2007), our approach was developed with the community and was designed to address their needs (Figure 4).

Based on this framework, the gaps in data that could be bridged through an ongoing mapping exercise spanning a three-year period were identified. As can be noted in Figure 4, UL's engagement was aimed mainly towards expanding the mapping of specific elements such as housing, public services, vulnerability, roads, and the local creek as well as hazardous locations of relevance for the community. That is, by taking Santos' (1997) definitions to further expand on the mapping of elements pertaining to the Form, the Process, and the Function of the community.

Through our interviews, a common pursuit among community leaders was identified regarding tackling vulnerability (both in a social and a physical sense) through mapping. Our focus was then to

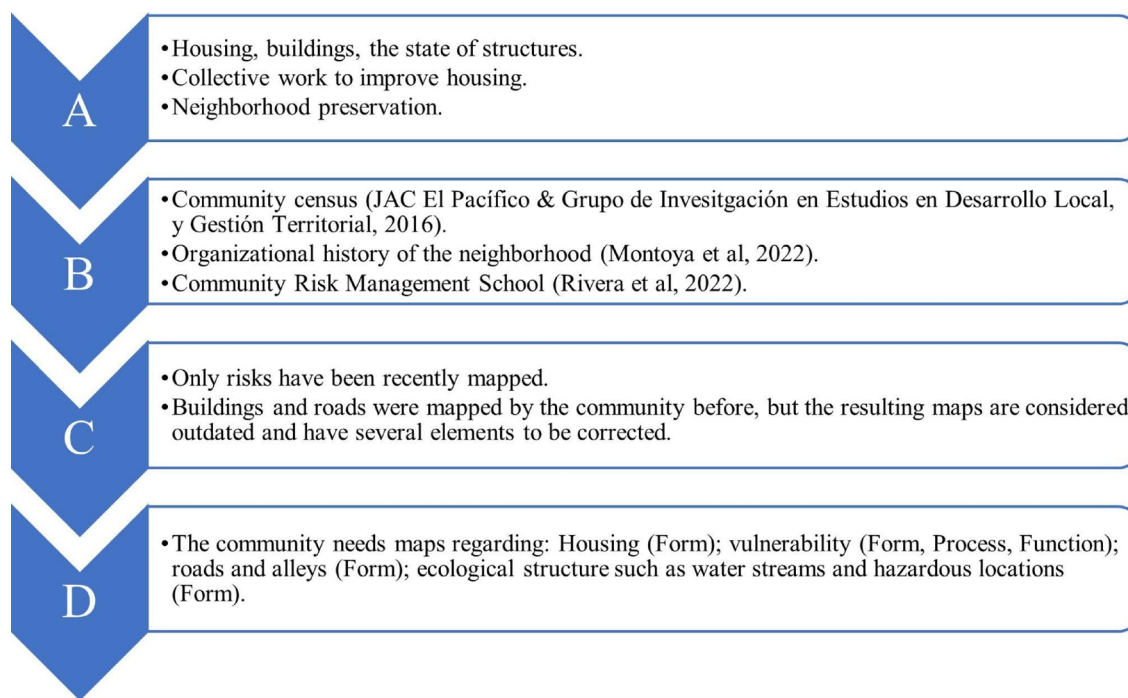


Figure 4. Summary of interviews with community leaders. Source: UL.

co-construct mapping data that would be of interest to the people of *El Pacífico* in their aim of enhancing their capabilities for disaster risk management.

To achieve this, we relied on the Open Street Maps (OSM) (https://wiki.openstreetmap.org/wiki/Main_Page) platform, which ensure an open science approach, which is one of the recommendations to overcome the challenges of the participatory mapping (Denwood et al., 2022). The OSM main webpage describes it as “a project that creates and distributes free geographic data for the world...because most maps you think of as free actually have legal or technical restrictions on their use, holding back people from using them in creative, productive, or unexpected ways”.

It is hence valuable to build cartographic tools that enable communities to recognize their territory and perceive other fundamental elements of its use, access, and interpretation that are related to the empowerment of local communities and territorial/social development (Barrera Lobatón, 2009). The advantages of the OSM family of tools (OSM, HOT, JOSM), which we believe crucial for choosing it as the best option for our purpose, are the following (Panek, 2015):

- The possibility of millions of users participating in the construction of maps that lead to a dialogical construction, taking advantage of the basic knowledge of the territory held by those who inhabit it.
- A friendly editing tool overcoming language barriers allowing people with basic computational skills to be part of the mapping sessions.
- No technical or legal restrictions, which allows people to have free access to maps and metadata and to modify their attributes and use them in later applications.

Results: Mapathon and post-disaster response mapping for enhancing risk management practices

The process of map co-construction began with an identification of the study area through an aerial photograph (orthophoto) of the year 2019 belonging to the research project *Resilience or resistance? Negotiated mitigation of landslide risks in informal settlements in Medellín* (Smith et al., 2019). Once the photograph was selected, a participatory project was created on the Humanitarian OpenStreetmap platform (HOT) (<https://tasks.hotosm.org/projects/8593>). Community leaders, neighbors of *El Pacífico*, and UL

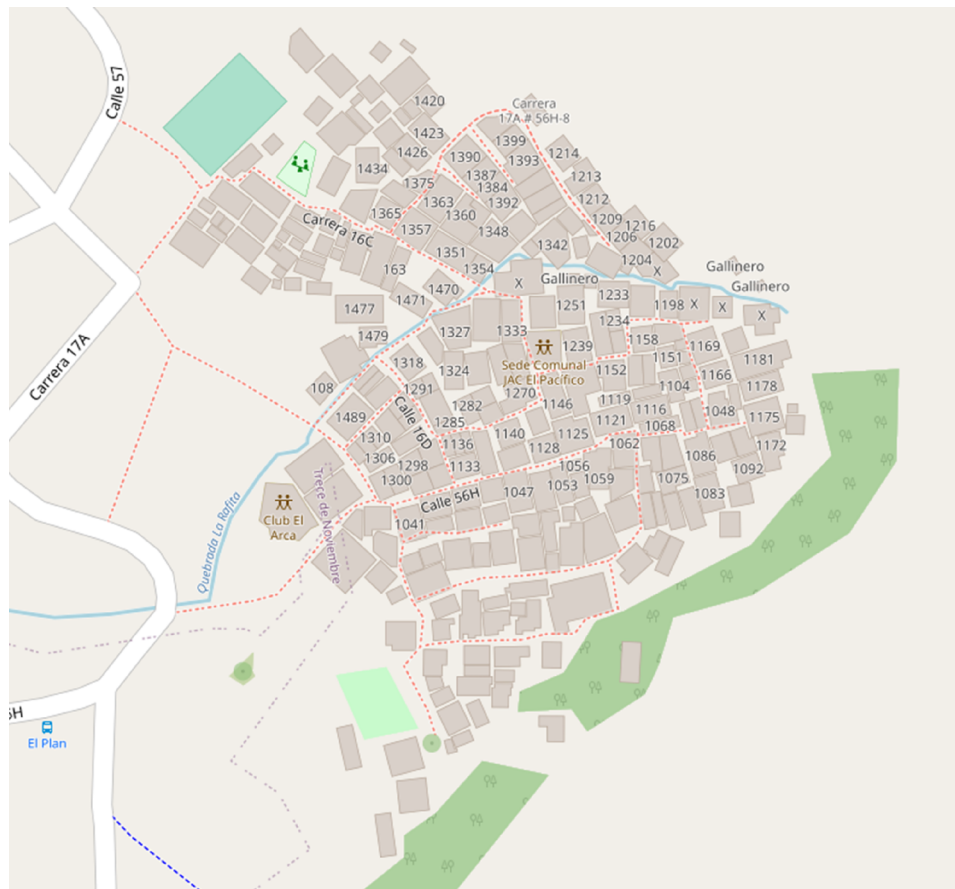


Figure 5. Basemap created on OSM. Atlas made on FieldPapers at <http://fieldpapers.org>.

project researchers were invited to participate in mapping training sessions and build the map during a “Mapathon” session, which functioned as a social event in which a group of people gathered digitally around the goal of producing geographical data for a territory (Porto de Albuquerque et al., 2019; Štampach et al., 2021), with each participant mapping a specific polygon.

The Mapathon was held on May 11, 2020. The outcome was a basemap intended to streamline the territorial planning process often led by the community leaders. A total of 258 polygons were drawn by the mapping team. Although most of these polygons were categorized as housing buildings, some were labeled as a sports field, a children’s playground, and two as community buildings. Although the resulting map is available globally through any OSM platform, the researchers created custom copies of these maps that could be more easily edited by the community (See Figure 5), including an orientation and a scale that would better depict the community’s territorial appropriation practices.

The first version of the map was validated on the Java OpenStreetmap editor (JOSM - <https://josm.openstreetmap.de/>) with assistance from JOSM staff. Following validation, the map was showcased to the community and, with their approval, published on OSM. It should be noted that before this map was co-created, the community had mainly engaged in mapping activities that relied on publicly available orthophotos on different open-source GIS websites, the most recent of which was from 2016. Nevertheless, the low-resolution satellite pictures, coupled with the lack of clearly defined borders for the neighborhood and buildings within, made it difficult to do an in-depth mapping exercise.

The dialogic approach to the construction of the cartography of the territory led to its appropriation by the community, who turned the maps into tools for negotiation in conflicts. According to Vélez Torres et al. (2012), research processes and products need to be intended to contribute to the strengthening of social organizations through the production of concrete tools of knowledge-power to advance in the organization, management, and defense of the territory. Fals-Borda (2014) suggests that since these practices can be used as political tools to legitimize territorial actions, new, more socially oriented, and

territorially sensible cartographies are one way to challenge the pre-established colonial models that define how Colombian cities function. In a similar vein, Santos (2000) argues that social mapping is one of the tools through which marginalized communities can charge their social discourse with political strength.

In light of these concepts, it is important to note three key results from our work with the community of *El Pacífico* since 2019 and how these have become tools the community uses for strengthening its decision-making capabilities when engaging in discussions with the municipality of Medellín³: (1) A disaster response map; (2) a community census and maps derived from it; and (3) a risk perception map.

- **Disaster response maps:** on 18 September 2020, there was a torrential avenue of the *La Rafita* creek, which runs through the *El Pacífico* neighborhood from east to west (Figure 6), affecting homes in the neighborhood. Using the OSM basemap map created during the Mapathon, a tour of the neighborhood was conducted to identify critical areas and evacuation routes, and as guidance for creating an action plan for the care, recovery, and stabilization of affected families (Corporación Jurídica Libertad, 2021). The map resulting from this experience showed which buildings had suffered damages (total or partial) due to the disaster scenario alongside an area from where DAGRD had issued a generalized eviction notice (see Figure 6). This map became an efficient tool for socializing the aftermath of the disaster and planning the upcoming recovery process.
- **Community census for data generation and strengthening community capacities:** Community leaders used the map, which was also derived from the event of September 18, 2020, to collect socio-demographic data about the residents and physical information of the houses. This information served to determine the needs and requirements of the neighborhood residents to negotiate with the municipal administration the necessary mitigation measures and action plans to guarantee the well-being of the community.

El Pacífico, Comuna 8, Medellín. 2021. Eviction zone and damaged houses from the 18/10/20 event

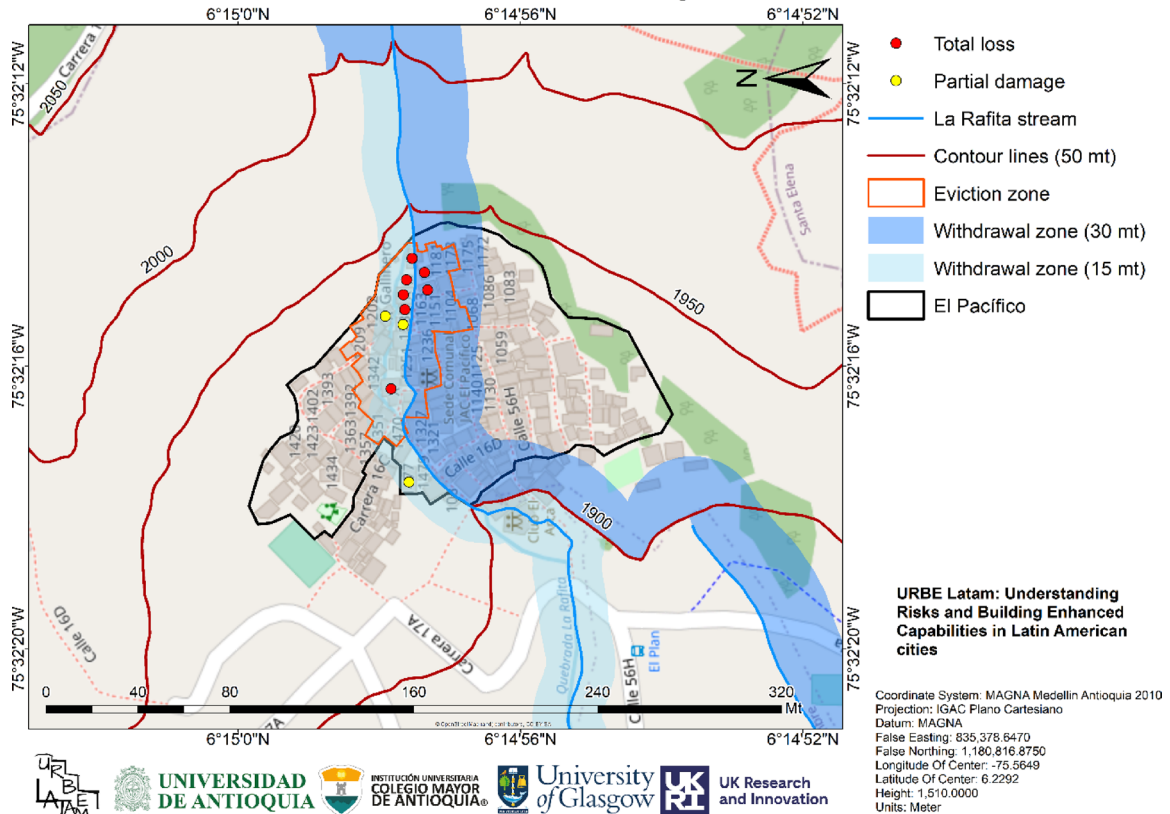


Figure 6. Damaged buildings during 18 September 2020 and eviction zone recommended by DAGRD. Source: UL.

Each community leader was assigned a different sector of the neighborhood and was responsible for gathering information from a specific part of the territory. To speed up the data-gathering process, each leader also formed sub-groups of data collectors with other interested neighbors.

The results from the community census were mapped after the data was collected in the form of social vulnerability maps, detailing which households had residents who were elderly (over 60 years of age), young children, or physically disabled people, which had pets, etc. A total of 8 maps were made with these data (see Figure 7 for one example of the results). The maps corresponded to the following variables:

- Adult population distribution.
- Elderly population distribution.
- Disabled population distribution.
- Children and teenage population distribution.
- Buildings with structural flaws.
- Buildings affected by disasters.
- Buildings with pets.
- Building height.

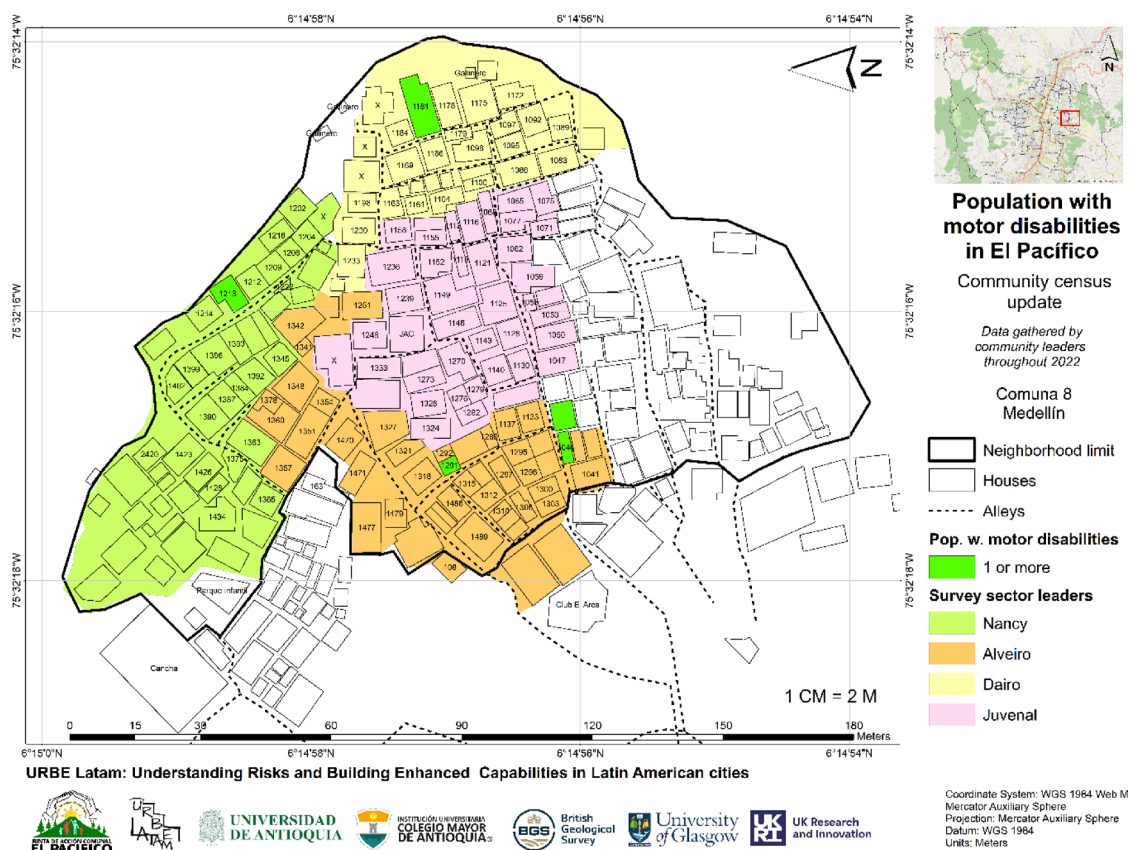


Figure 7. Population with motor disabilities in *El Pacífico*. Source: UL.

- **Risk perception map:** On 12 June 2022, a planned tour was conducted with various community leaders and university students as part of the cartographic co-production between the community and several universities in the city (including some connected to the UL project). The goal was to identify the most imminent risks for the community in each area of the neighborhood (see Figure 8 for the resulting map).

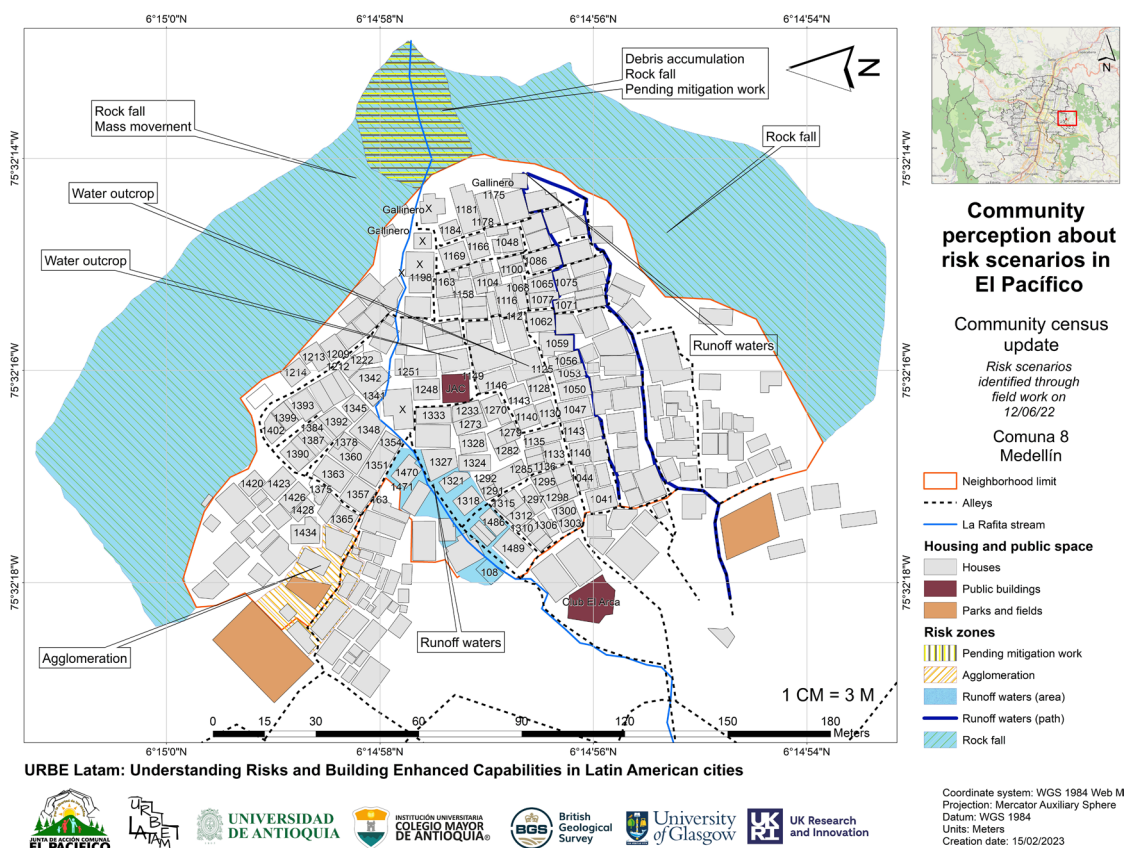


Figure 8. Risk perception map. Source: UL.

Discussion: Re-thinking how we approach mapping with grassroot organizations

By employing Milton Santos' notions of Form, Function, Structure, and Process, self-built communities and researchers can create maps that transcend physical boundaries and capture the social, economic, and political dimensions of their spaces. This comprehensive understanding can help grassroots organizations, institutional actors and academics make informed decisions regarding disaster risk management, resource allocation, and community participation in post-disaster recovery processes.

Interlinking participatory mapping with open-source mapping platforms based on a framework such as Santos' (1997), which aims to better understand a territory from multiple angles based on critical geography, can become a reliable method for interdisciplinary research, while also facilitating the construction of socially relevant and sensible cartographies that aid in narrowing the gap left behind by the absence of government action in self-built settlements.

In essence, this kind of approach is a proposal to strengthen empirical research by taking a look at a relevant critical geography theoretical framework and working upon it from a socially sensible viewpoint, like its original author intended. Such approaches have been explored in the past (Lopez & Kuc, 2009), but more relevancy is needed in this field, especially given the shortcomings of governments to answer to crises in vulnerable communities with data gaps such as it happened with the Covid-19 pandemic (Sattler et al., 2022). Such approaches could also aid in expanding participatory mapping as it currently stands, as suggested by the works of Panchyshyn and Corbett (2022) or create other angles of analysis for avenues such as community asset mapping for violence prevention experiences, as explored by Taliep et al. (2023).

The challenges that this type of approach faces rest in how well can Santos' definitions be translated into the interests of communities, as well as how to articulate this into the local agendas without intruding in the most intimate and local issues. In the same vein, a challenge that researchers and public servants face is how to put their trust in communities' empirical knowledge for risk management and mapping their own spaces when "official" data is insufficiently available.

Conclusion: Understanding the Form, Function, and process: the Structure of *El Pacífico*

The maps produced after three years of interaction between researchers and the community show our attempt to narrow the existing data gap faced by barely legal settlements in Medellín. It can be seen from the maps that the data is not standardized. Rather, relying on our dialogic approach, each design and mapping product was shaped by the interaction between an interdisciplinary group of researchers, community members, and whatever pressing need came into play (disaster response, sociodemographic data gathering, digitizing fieldwork, etc.). In this context, the basemap productions have proven to be a solid steppingstone for the development of new and varied layers of information.

In broad terms, the concepts of Form, Function, Process, and Structure proposed by Milton Santos can be extremely helpful for self-built communities in Latin America in post-disaster scenarios, particularly for mapping purposes. Regarding the experience of *El Pacífico* and UL, the following conclusions were reached:

Form

For mapping purposes, understanding the physical form, ergo, the community's self-defined aesthetic (not only visual, but also political, cultural, etc.) both before and after a disaster occurs, allowed us to assess the physical damage caused by the disaster, including identifying how elements from within the territory correlate with the destroyed infrastructure, damaged buildings, altered topography, and other spatial elements. In this sense, *El Pacífico* identified itself as an urban community lying on top of a steep slope of Medellín, where they must coexist not only with the slope but also with a nearby stream.

The residents are aware they are living in a geologically and hydrologically hazardous zone, yet this does not deter them from wishing to stay there. Instead, their link with the slope empowers them to regard themselves as the guardians of the high slope, with the responsibility to manage risks at the top to prevent disasters in communities located down below. Additionally, the Mapathon and the resulting maps allowed the residents to feel more empowered of the slope, instead of feeling at the mercy of its risk scenarios. This learning, which is essential for future work with any cartographic technique, allowed them to create a legitimate view of their territory in an, at least to some extent, "official" platform such as OSM, strengthening their recognition and visibility beyond the municipal district.

Function

Analyzing the function of different spaces within the community was essential for post-disaster mapping. This involved identifying the purpose and use of various areas such as residential zones, public facilities, commercial areas, and community spaces. Mapping the function helped prioritize recovery efforts by identifying critical areas for immediate rehabilitation, as well as the actors responsible for these functions.

A key finding was that the majority of residents work in informal employment while those who are formally employed do not usually have a permanent form of economic stability either. As a result, it becomes necessary to constantly strengthen the social network through community work such as *convites*, which are community-driven workdays carried out to improve the living conditions of the residents, through the reinforcement of housing, the use of common neighborhood equipment, and the implementation of community risk management measures. According to the neighborhood's residents, the *convites* are also seen as a place for sharing. Anyone who attends one is expected to contribute whatever they are able, including food, drink, supplies, or labor (Montoya Bedoya et al., 2022).

Process

Mapping the processes at play within the community after a disaster provided valuable insights. This involved understanding how people adapt, respond, and recover from a disaster, as well as identifying the emergence of new processes or changes to existing ones. The dynamics of recovery, resource allocation, community mobilization, and decision-making were tracked through the mapping of these processes.

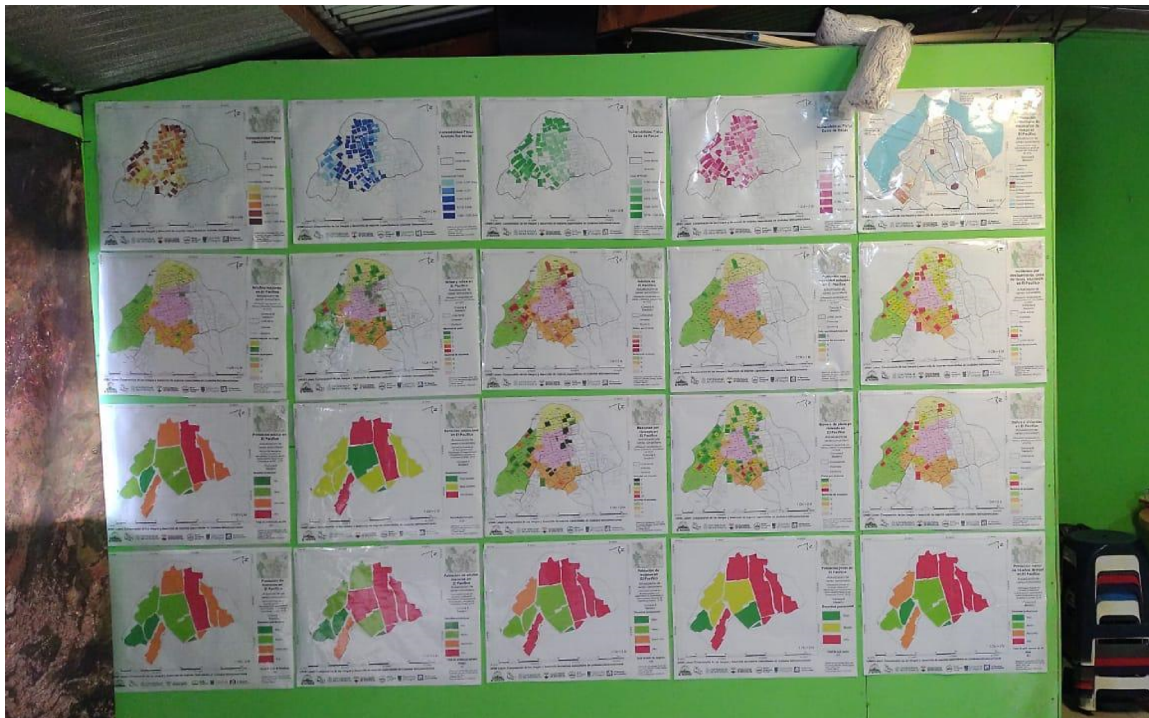


Figure 9. A mural set up by *El Pacífico's* JAC containing the project's resulting maps. Source: *El Pacífico's* JAC.

Regarding the Process, *El Pacífico's* JAC has been the grassroots organization under which the residents have gathered to claim their rights to remain in their neighborhood and to receive the equipment they need to prevent and deal with disasters like the one that occurred in September 2020. This organization is also in charge of calling and coordinating the previously mentioned *convites* and serves as the center of the mapping and data-gathering process. After the information was processed and organized, the JAC's main building, which is located in the center of the neighborhood, continued to serve as a sort of data-mapping museum (see [Figure 9](#)).

Structure

Recognizing the underlying social, economic, and political structures that shape the community was crucial for effective mapping in post-disaster scenarios. Mapping the structural aspects involved identifying power relations, social networks, economic disparities, and institutional capacities. Understanding these structures helped in identifying the most vulnerable households, assessing resource distribution, and considering social equity in the recovery and reconstruction process.

The previously described elements combined together give meaning to the Structure of *El Pacífico* as a whole. The residents perceive their neighborhood as the result of their 28-year struggle for their right of belonging to the city of Medellín. Along the way they have experienced displacement due to the Colombian armed conflict as well as the city's socioeconomic model (Moreno & Rivera, 2022), have shared their lives with the mountain and the creek through many extreme events, and have witnessed rockfalls and landslides within their own and nearby communities. Despite these hardships, they chose to stay and defend what they believe is a dignified way of life.

Reverting to the original visualization proposed in Santos' notions of territory (see [Figure 10](#)), a way to understand the previously exposed elements signals that at the center of the neighborhood lie the organizational processes, particularly that of the JAC, and their main strategy for community action: *convites*, alongside mapping and engagement activities with academic and institutional actors.

The way the territory is defined translates into how its inhabitants coexist with the surrounding natural elements, which, despite having the potential to pose a risk to human life, are recognized by the locals as something that must be understood and respected for them to continue living in close

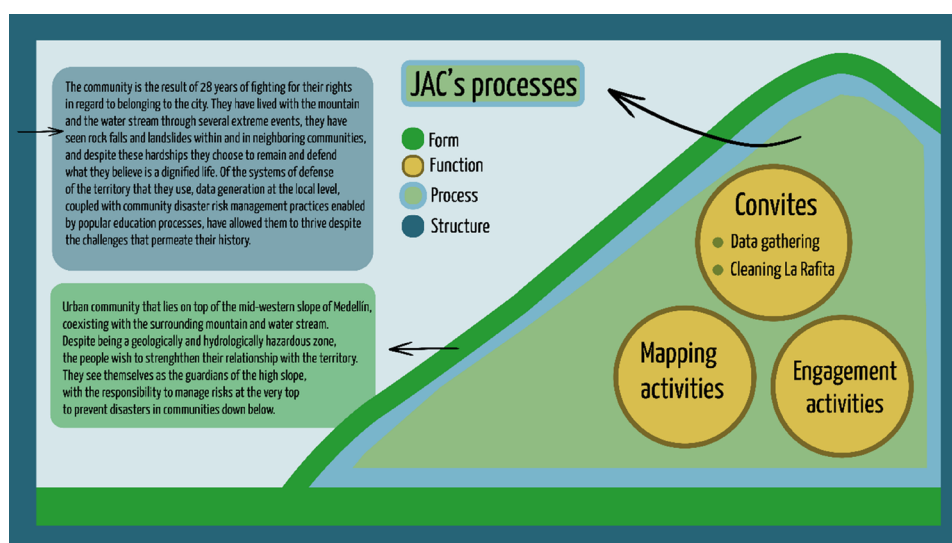


Figure 10. Santos' notions of territory considering the experience of UL and *El Pacífico*. Source: UL.

proximity to these elements in the best possible way. The structure, akin to the social, political, cultural, and economic background that nurtures *El Pacífico's* history, thus becomes a mixture of struggles for survival, recognition, and the claiming of human rights, while also being a celebration of life, community achievements and a sense of belonging and camaraderie, as well as responsibility for disaster risk management that is uncommon in other territories, whether legal or barely legal, of Medellín and elsewhere.

In practical terms, the resulting maps were used by the community for strengthening their own disaster risk management plans, specifically around pairing both the vulnerability, sociodemographic and hazard maps to better understand the risk scenarios that they currently face, as well as functioning as a baseline for future actions focused on the impacts of climate change (Monsalve, 2023). However, it is important to also wonder if these maps not only could, but should be recognized by public institutions. Would this aid in narrowing the persisting gaps in socio spatial data by legitimizing citizen-generated data? Or would it instead potentially turn into a bureaucratization of participatory mapping? Further research that focuses not only on community interaction, but also government integration is needed for this.

It is thus imperative for self-built and academic communities to strengthen their bonds through sharing knowledge and experiences regarding community mapping through participatory and popular education techniques. It is also important to look beyond simply mapping and instead focus on building community capabilities for maintaining, updating, and re-designing mapping practices for creating self-maintained, living maps that more closely resemble Santos' notions on territory, while also aiding in recalibrating risk mapping as a grassroots technique.

These living maps could be likened to pictures that are frequently taken and updated by those who occupy these spaces and who, ideally, can become not just a sort of metaphorical photographers, but also skilled artisans in editing and updating these photographs in accordance with their needs without dependence on external actors such as government institutions or universities.

Notes

1. The reason why the North arrow points west in most of the maps is because this is the angle in which the community felt most comfortable when reading and mapping their territory.
2. Such discussion was reserved for another research process after UL, which does not fit into the scope of the present paper.
3. The maps showcased in the results section were originally made in Spanish but were translated into English for the purpose of this article.

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No potential conflict of interest was reported by the author(s).

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