THE SOCIAL NATURE OF URBAN NATURE

A QUALITATIVE STUDY LINKING VALUE ARTICULATION AND CONTESTED GEOGRAPHIES IN SANTIAGO DE CALI, COLOMBIA

"Carnival for Life" or *Carnaval por la vida* was a 5.000-people mobilization organized by activists of *comuna* 18 and *corregimiento* La Buitrera in Santiago de Cali in 2014. The aim was to raise awareness of the need to protect the Meléndez River—the City's pride back in the 50s and now significantly transformed. An important front of this struggle was *El Morro* ("The Hill"), an area locals attached environmental and cultural values to but that was designated for housing developments by the City Administration.

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The social nature of urban nature:
A qualitative study linking value articulation and contested geographies in Santiago de Cali, Colombia

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Declaration:

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged.

Signed:

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Executive Summary

This research applies "The social production of ecosystem services: A framework for studying environmental justice and ecological complexity in urbanized landscapes" (Ernstson, 2013) in the city of Santiago de Cali, Colombia. Broadly speaking, the framework was inspired by the increasing evidence on civil efforts to protect nature in cities—different from top-down and elite-oriented conventional conservation measures. However, this is only half of the story. Ernstson devotes special attention to power relations as they lie at the heart of such *protective narratives*, implying that certain voices—or values—will prevail upon others. Secondly, place-based struggles develop in a wider context: the city, understood here as an ecological network enabled by complex ecological processes that unfold across *nodes* and *links*. And importantly, those ecological processes are susceptible to day-to-day practices on site.

Taken together, both analytical modes—value articulation and the ecological network perspective—make evident the role humans play in the generation and distribution of ecosystem services, but most importantly it raises the question of who can actually take part into these value-creating processes. This research therefore approaches the ecology of cities as a testimony of *relational*[1] rather than pre-determined dimensions (ecological units distributing ecosystem services on equal basis) and as a result of how power operates locally. Few such studies have been done Colombian cities.

To this end, two case-studies were carried out in sites where communities of opposite income levels live—a river and a wetland. Questions analyzed across case-studies were: (i) how actors constructed and hierarchized values towards nature; (ii) what *artifacts* and *social arenas* did they appeal to in order to legitimize their *protective narrative*; and (iii) how these place-based struggles impacted the generation and distribution of ecosystem services city-wide. Data collection was based on qualitative interviews, participatory observations, historical and news archive, and reports from the City Administration. This research is built on the theories of Ecosystem Services, Social-ecological Systems, Critical Geography and basic principles of Landscape Ecology. A commonality between the case study sites was that both were under high development pressures and the ecosystem services approach served as a platform to legitimize the importance of these sites. Differences dealt with the social arenas involved, the strategies activists appealed to in order to link artifacts to people, what was at stake in each case, and whereas a cohesive vision (or lack of it) explained the outcome.

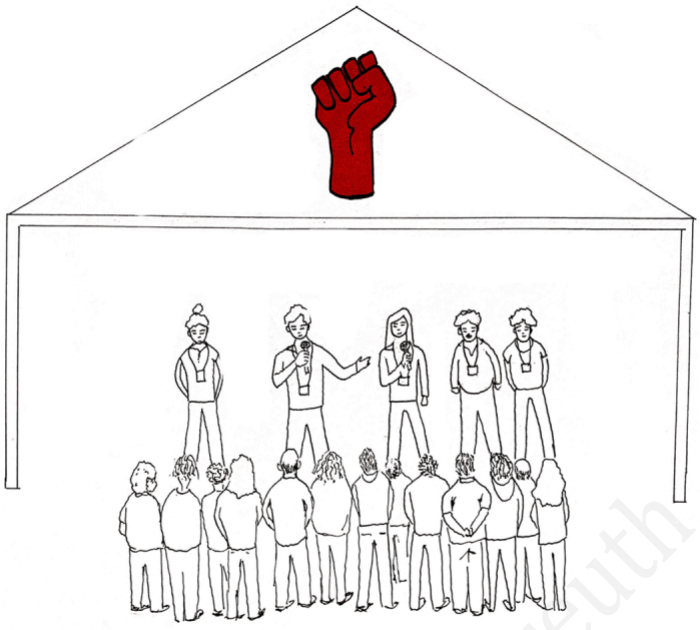
[1] Escobar (1999) defines "Organic Nature" as the multiple constructions of nature—sets of uses and meanings—emerging in contexts of power (p. 230). In this sense, the author defines the ecology of ecosystems from relational dimensions embedded in the "system" and from the experience itself.

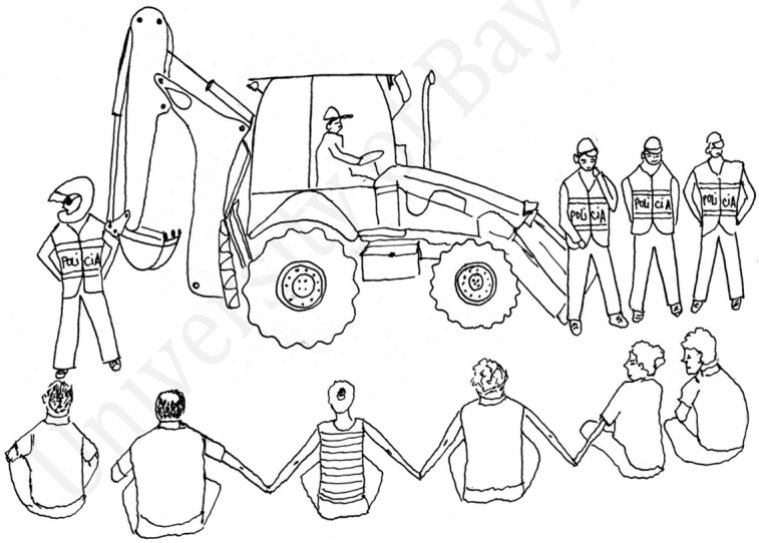
Graphical Summary

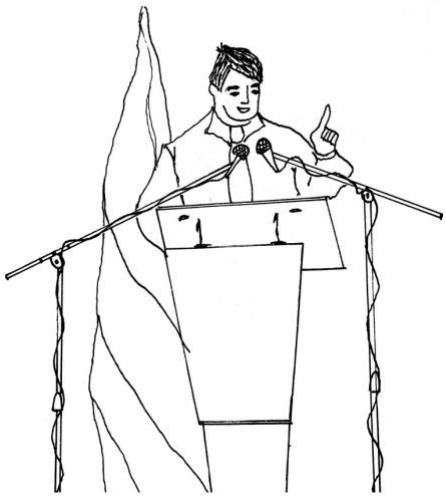
First analytical mode: Value-creating processes (artifacts and social arenas)

Case study 1. Municipal Reserve for the Sustainable Use of the Meléndez River (RMUS), placing emphasis on 'El Morro' struggle.

(case study 1 *cont.*)







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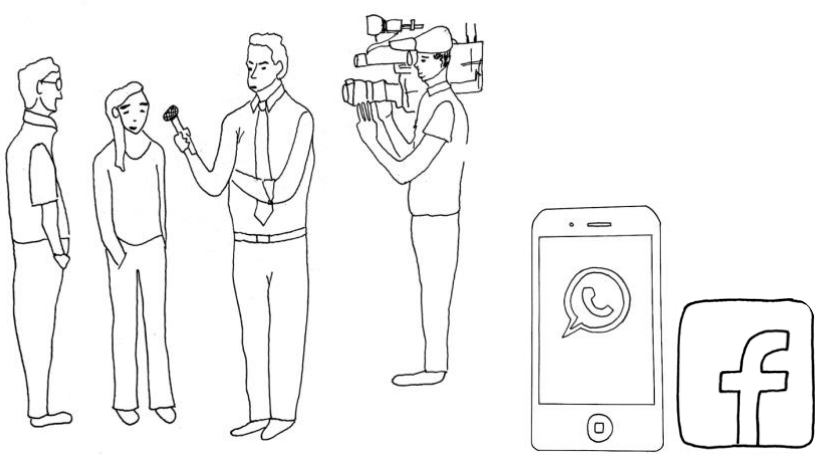
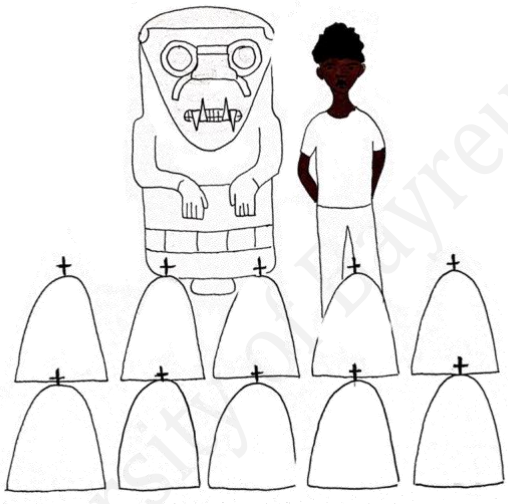
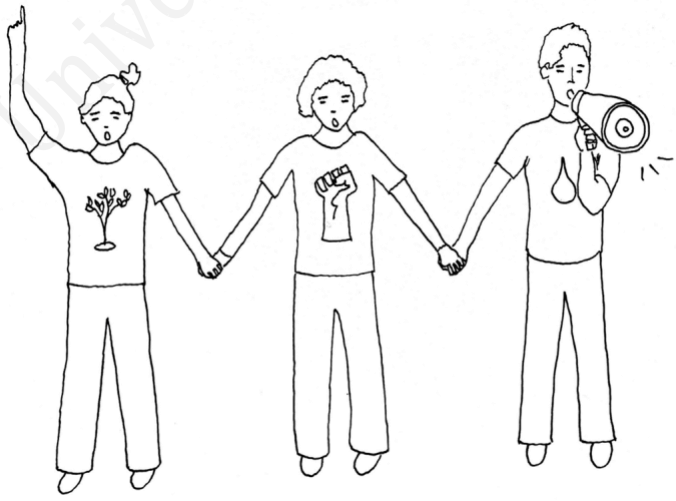
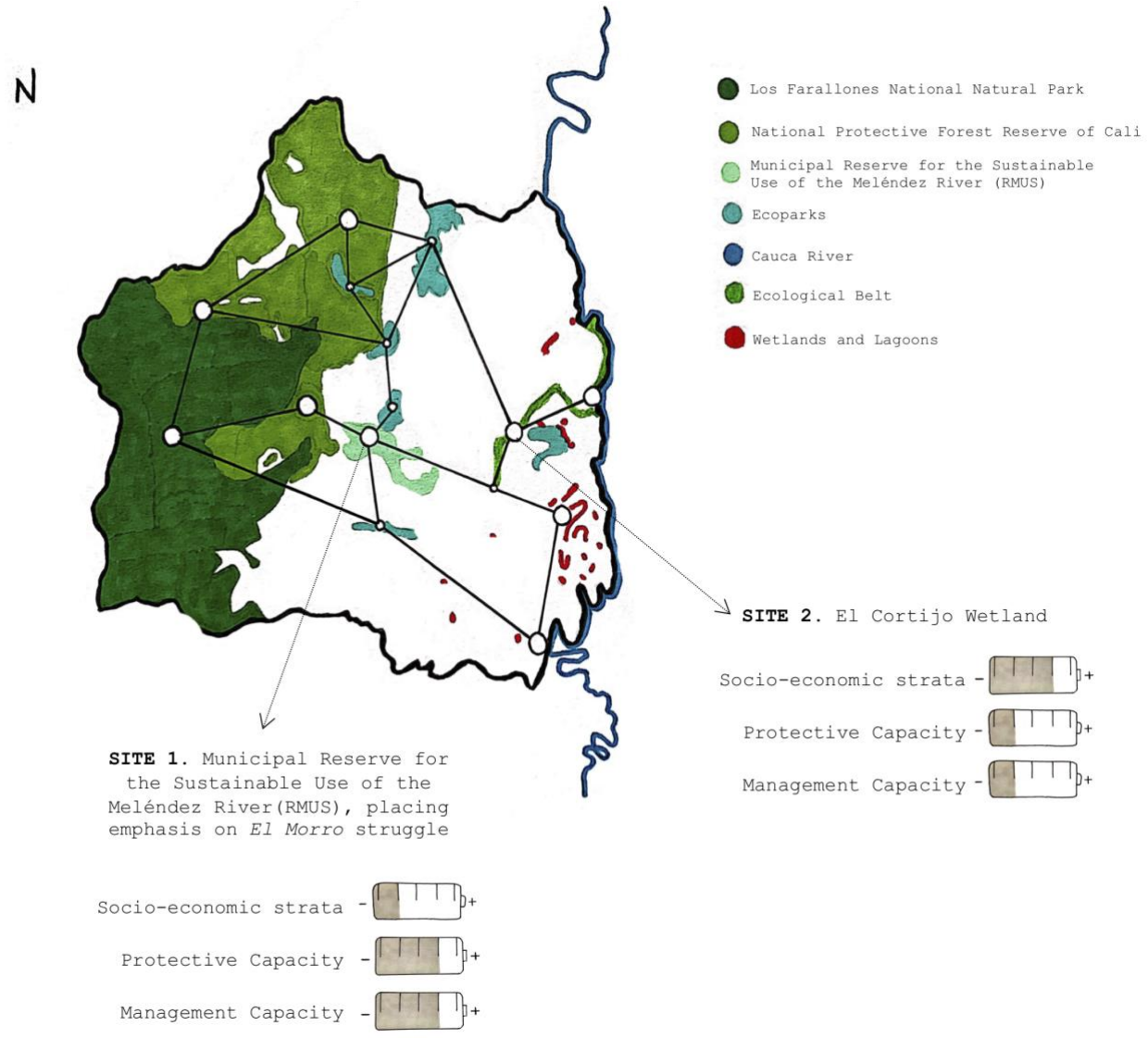






Disclaimer: i. This graphical summary doesn't feature the complete set of artifacts and social arenas used by activists throughout the years.
ii. Certain social arenas were used by activists in both case studies e.g., press, blocking machinery.

Second analytical mode:
Cali City as an ecological network and case study sites



Disclaimer: i. This map is a partial representation of Cali's Ecological Main Structure (EMS). The complete EMS is shown in Figure 4. in this manuscript.
ii. Levels indicated in the batteries do reflect the results of this research, yet they don't represent an actual quantitative assessment.

Illustrations by Colombian artist .petitmujeramarilla. © María Mejía, 2019

Highlights

- Development pressures prevailed in the case study with the strongest protective capacity and management capacity—*El Morro* ("The Hill"). This site is located in the Meléndez River medium-low basin, a low-income, working-class area of the city.
- Despite activists of *El Morro,* and broadly speaking of the Meléndez River, employed significant artifacts and social arenas since 2006, this case is still invisible citywide if one is to compare to recent mobilizations.
- Until the moment this field work was completed, works in the second case study—El Cortijo Wetland—were still blocked. This site is located in an upper-middle income area of the city.
- Activists from El Cortijo Wetland have employed a smaller number of artifacts than *El Morro* case, but it resonated much more among the public opinion. Protective capacity and management capacity of this site is not as strong as in *El Morro* and the Meléndez River case study.
- Although *El Morro* is embedded in the Meléndez River and its local protected area (RMUS)—hence a significant piece of urban nature for the ecological connectivity of Cali City—its main contribution was local. Surrounded by private green areas, *El Morro* was the only large and public green area *comuna* 18 dwellers could freely access and use.
- El Cortijo Wetland narrative was built upon four environmental attributes. However, public opinion gave preeminence to the wetland and secondly the Tropical Dry Forest (TDR)—making it hard to internalize the importance of the entire hydrological system. Nevertheless, the struggle opened up a new layer: a wetland nobody knew before and the existence of an endangered ecosystem (TDF) in the urban fabric.
- The analysis of the Ecological Main Structure of Cali City (2014), a top-level planning instrument for municipalities in Colombia, led to the identification of contested values—those created on the ground by advocates and those articulated from top-down perspectives and more 'virtual' realities.

List of abbreviations

DAGMA	Administrative Department of Environmental Management (Departamento Administrativo de Gestión del Medio Ambiente de Cali)
CAT	Environmental Territorial Commission (Comisión Ambiental Territorial)
DANE	National Administrative Department of Statistics (Departamento Administrativo Nacional de Estadística)
CVC	Regional Autonomous Corporation of Valle del Cauca (Corporación Autónoma Regional del Valle del Cauca)
DAPM	Administrative Department of Municipal Planning (Departamento Administrativo de Planeación Municipal de Cali).
DNP	National Planning Department (Departamento Nacional de Planeación)
EMCALI	Municipal Companies of Cali (Empresas Municipales de Cali)
EMS	Ecological Main Structure (Estructura Ecológica Principal)
ICAU	The Urban Environmental Quality Index (Índice de Calidad Ambiental Urbana)
JAC	Communal Action Board (Junta de Acción Comunal)
POT	Land Use Plan (Plan de Ordenamiento Territorial)
RMUS	Municipal Reserve for the Sustainable Use of the Meléndez River (Reserva Municipal de Uso Sostenible del Río Meléndez)
SIMAP	Municipal System of Protected Areas (Sistema Municipal de Áreas Protegidas)
NPO	Nonprofit Organization
TNC	The Nature Conservancy

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1. Introduction

Today, Latin America and the Caribbean (LAC) is the second most urbanized region in the world. In this region, 81% of the population live in urban areas, only slightly surpassed by North America with 82% (United Nations, Department of Economic and Social Affairs, Population Division, 2018). Although the so-called urban explosion in LAC took place between 1950-1980, and urbanization worldwide is now shifting towards Asia and Africa (India, China, Nigeria) the region is embarking into a new phase of urban consolidation: either of megacities (México D.F. or São Paulo) or by creating new spatial forms as the city-region (Cohen, 2004, p. 39). Colombia locates in the latter, with multi-nodal systems around large cities, banded together by economic ties. In fact, by 2050 it is estimated that 18 million new urban dwellers will be mostly concentrated in a few urban agglomerations. According to the National Planning Department, DNP (*Departamento Nacional de Planeación*), Santiago de Cali (henceforth, Cali) and nine municipalities around it[2], will be the second largest urban agglomeration of Colombia by 2050, after Bogotá (2014, p. 35).

Urbanization in Latin America has been a traumatic transformation, ruled by environmental degradation and social inequality (BID, 2016; CEPAL, 2017). In Colombia, despite efforts to define environmental determinants as a top-level hierarchical planning guideline, urbanization has led to significant ecological and environmental transformations. The former (ecological transformation) refers to the impact of urban expansion on agricultural land and surrounding wetlands, deforestation and erosion of upper basins as well as erratic decision-making compromising water bodies and vegetation coverage in the urban fabric itself. The latter mainly refers to poor air, water and soil quality in our cities and urban regions (Ministerio del Medio Ambiente de Colombia, 2002).

In 2013, the Ministry of Environment and Sustainable Development of Colombia launched the Urban Environmental Quality Index, ICAU (*Índice de Calidad Ambiental Urbana*), an assessment based on 17 indicators ranging from Air Quality, Water Quality to Protected Areas with Management Plans in place, Green Area per person and People linked to Environmental Education Initiatives. According to this assessment, the main challenges environmental authorities and local governments faced when reporting the ICAU were capacity gaps, poor institutional cooperation and that they repeatedly fail to report environmental data to other agencies. For instance, many environmental authorities and local governments didn't report the ICAU to its full extent, although the

[2] Based on work communality estimations, the DNP identified nine nodal cities shaping Cali's urban agglomeration: *Villa Rica*, *Padilla*, *Puerto Tejada*, *Candelaria*, *Florida*, *Pradera*, *Yumbo* and *Vijes*.

data informing it were supposed to be available since 1993, by law. The overall outcome for the city of Cali was 'Low'. The best-qualified indicators were People linked to Environmental Education Initiatives (64%) and People living in high-risk areas (2%), whereas People exposed to high noise levels (60%) and Protected Areas with Management Plans in place (5.2%) were the main weaknesses. Green Area per Person was within the medium range (MADS, 2017). Table 1. summarizes results nationwide for 2013 and 2017.

Table 1. Urban Environmental Quality Index for some cities in Colombia

	2013 ICAU Report **9 cities (> 500.000 people)**	**2016-2017 ICAU Report** **38 cities (100.000 to 500.000 people)**
Very High	0	0
High	0	0
Medium	33%	26%
Low	45%	42%
Very Low	11%	8%
No data	11%	24%

Finally, urban agglomerations in Colombia are not only human hotspots. Settled on the Tropical Andes, Chocó-Biogeographic and Magdalena Regions, some of the largest agglomerations are in fact biodiversity hotspots. According to a global forecast linking urbanization and biodiversity hotspots to 2030 (Seto, Güneralp, & Hutyra, 2012), if current trends in population density continue, it is very likely (probability >75-100) that an area of 5,4 Km^2 in the Tumbes-Chocó-Magdalena corridor undergoes urbanization by 2030 and consequently 2% of the hotspot will be transformed. On the other hand, in regard to species defined by the Alliance for Zero Extinction or 'AZE species'[3], the study concludes that despite highest projected urbanization is in China and India, it is Central and South America where the largest number of species will be affected by urban expansion (p. 16087). Although these estimations are not broken down per country, they draw attention to urban expansion in Cali as the city is embraced by the Chocó Biogeographic Region.

The question of who can take part in value-creating processes towards urban nature, especially in environments hosting exuberant yet contested nature, where irregular and often unregulated land use patterns reinforce social inequalities, seems to be an imperative if we are to address just and livable cities. Both case-studies analyzed in this research portray how value-creating processes have driven actors to find themselves in a tug-of-war over urban nature, where certain values (ecosystem services) are being unduly disregarded over others. For example, whereas a hill should remain as an open

[3] AZE species are defined according to their level of endangerment, irreplaceability and discreteness (Alliance for Zero Extintion, 2019).

field for popular classes to play golf and fly kites or as land for housing projects (case study 1); or whereas a wetland should be preserved as a sponge-type site next to a river or intervened to give way to a transport terminal (case study 2). The aim of this research is thus to unpack power relations underlaying such value-creating processes. This refers to the ways in which advocates articulate and mobilize their *protective narratives* toward pieces of nature, here understood as 'nodes' of the ecological network of the city.

What follows is the outline of the theoretical framework explaining how each analytical mode—value articulation and the ecological network perspective—come together. To develop this reasoning, I refer to theories of Ecosystem Services and Social-Ecological Systems; and contributions from Critical Geography and Landscape Ecology. Taking together, both analytical modes bring to mind a more complex vision yet closer to reality if we are to address environmental justice in relation to ecosystem services.

1.1. Theoretical context

1.1.1. Ecosystem Services

In 2005, the Millennium Ecosystem Assessment released "Ecosystems and Human Well-being: Synthesis" and defined ecosystem services as the 'benefits people obtain from ecosystems', classified by provisioning, regulating, cultural and supporting services (MEA, 2005). From this point onwards the framework escalated in academic literature and policy-oriented reports. Indeed, in his text about the rise, scope and limits of the ecosystem services framework (2017), Ecological Economist R. Muradian posits the framework was an important innovation in sustainability science, "probably only compared with the concept of sustainable development in terms of widespread adoption and rapid dissemination" (p. 195). The MEA's classification enabled the general public to grasp the relation between biodiversity, ecosystems and all human well-being constituents.

This momentum was somehow reflected into urban research and for the first time, in 2005, the references to urban ecosystem services surpassed 20 academic articles, and over 120 by 2011—roughly 12% of the total academic literature addressing the term "ecosystem services" that same year (Ernstson & Sörlin, 2013). In the global assessment "Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities" hosted by the Convention on Biological Diversity (2013), Gómez-Baggethun and colleagues thoroughly classified the ecosystem services urban areas offer e.g., air purification, microclimate regulation, carbon sequestration, pollination and seed dispersal, recreation, among others. The authors also underlined ecosystem functions

and components e.g., absorption of sound waves by vegetation and water, habitat provision, ecosystems with recreational values, etc., and the ecological infrastructure associated to those functions e.g., urban forests street trees, urban green areas, allotment gardens, etc. (Gómez-Baggethun, et al., 2013).

Table 2. Ecosystem categories and types relevant to cities. TEEB 2011

Category	Description	Examples in cities
Provisioning services	Ecosystem services that describe the material or energy outputs from ecosystems.	Food; raw materials; fresh water; medicinal resources.
Regulating services	The services that ecosystems provide by regulating the quality of air and soil or providing flood and disease control, etc.	Local climate and air quality regulation; carbon sequestration and storage, moderation of extreme events; water-water treatment; erosion prevention and maintenance of soil fertility; pollination, biological control.
Supporting services (or habitat services)	These services underpin almost all other services. Ecosystems provide living spaces for plants or animals: they also maintain a diversity of plants and animals.	Habitats for species; maintenance of genetic diversity.
Cultural services	These include the non-material benefits people obtain from contact with ecosystems. They include aesthetic, spiritual and psychological benefits.	Recreation and mental and physical health; tourism; aesthetic appreciation and inspiration for culture, art and design; spiritual experience and sense of place.

On one hand, this research speaks of the complexity of ecological processes supporting the generation and distribution of ecosystem services. These ecological processes tie the network together, connecting green and blue areas across the city, from private gardens and small pocket parks to urban forests and watersheds. On the other, the ecosystem services framework alludes to the idea that actor groups choose certain values—and not others— towards nature. Consequently, what is socially defined as of "value" (ecosystem services) is embedded in an intricate ecological network that generates them.

Important to note that value articulation is shaped by power relations, which enabled or constrained the capacity of actor groups to legitimize what they decide is of 'value' and in need of protection. This is how the research puts forth ecosystem services as an outcome of social practices, rather than "merely reflecting an objective biophysical reality" (Ernstson & Sörlin, 2013, p. 274). Lastly, this research will not grapple with judgmental work against the ecosystem services framework, for instance the monetary-non-monetary polarization. Precisely, Ernstson's purpose with this framework is to contribute to it from within, by moving the large and complex work on ecosystem services toward political conversations.

1.1.2. Ecosystem services and contested geographies

1.1.2.1. Social-ecological Systems

In 1998, Berkes & Folke used the term "social-ecological" system to emphasize the integrated concept of humans-in-nature and to stress that the delineation between social and ecological systems is artificial and arbitrary (Folke, Hahn, Olsson, & Norberg, 2005). Not stability but rather adaptation to (permanent) change is what this approach is more interested in. In seeking to understand how adaptation develops across two complex systems—social and ecological—, Folk et al. refers to resilience as the organizing concept and based on case studies, authors identified social responsiveness to environmental change. For example, how individuals and/or organizations generate knowledge, learning and experience, and mobilize memory and meanings in order to reorganize the system and keep navigating in a permanent state of change. The idea that individuals—knowledge careers, knowledge generators, stewards, leaders, people who make sense of available information; also knowledge retainers, interpreters, facilitators, visionaries, experimenters, and so forth—do actually support ecological functions through their management practices and social capital (networks, leadership, trust, social memory) lies at the core of the social-ecological system theory.

For instance, the Wetlands' Foundation of Bogotá, a non-profit organization established in 2011, complemented the official inventory of urban wetlands by adding up 20 wetlands and 45 water bodies found in schools, universities, country clubs, parks (private and public), cemeteries, reservoir and *páramos* (high altitude wetlands). Since 2014, thanks to the support of over 100 volunteers taking part in field trips and activities of citizen science and memory preservation, the Foundation has now assembled a participatory map on urban wetlands for the city of Bogotá. The map is a new artifact to sensitize urban policies to ecological and cultural values that water bodies hold (Fundación Humedales de Bogotá, 2016; Escobar J. , 2017). Up to date, this group of citizens has identified approximately 3.000ha of new of wetlands, thus uncovering a new layer the City Administration didn't know about before.

Another example is the Ecomunitario Group, a neighbors' association striving to influence the City plans with regard to vegetation and pest management by positioning The Great Chicó (*El Gran Chicó*)—including private gardens—as a 'green dispersal corridor' (Tannier, Foltête, & Girardet, 2012). The idea here is to boost The Great Chicó as an ecological link to the massive Eastern Hills of the city by using local knowledge on pollinators and seed dispersal. As for 2015, 90 species of pollinators were identified and

since then, the Group has actively mobilized knowledge on press and social media (Caicedo, Sáchica, Rodríguez-C., & Parra-H., 2017).

However, findings derived from a recent review on how the 'social' aspect is understood, and thus operationalized in SES analytical frameworks (Stojanovic, et al., 2016), points out that SES fail to address power and competing value systems as an integral part of SES development and functioning (Cote & Nightingale, 2012). Specific critiques refer to the systematization of social dynamics as it veils social issues e.g., inequality or economic marginalization (Glaser & Glaeser, 2011); and the choice of social variables observed (Turner, 2014) for instance, "resource extraction, population, and material benefits receive greater consideration than values, equity, nonmaterial and psychological aspects of well-being" (Stojanovic, et al., 2016, p. 3).

Echoing these findings is the fact that the SES discourse was developed in non-urban research, which could partially explain why the theory downplays the role of power and economic marginalization in the social-ecological coupling. Here is where Ernstson (2013) poses the need of a second discourse to link the SES approach to power dynamics, but also to allow framing the generation and distribution of ecosystem services in urbanized landscapes. The second discourse proposed is critical geography.

1.1.2.2. Critical Geography

As mentioned in the introduction, benefits and burdens derived from urbanization have been distributed unevenly across cities in Latin America, and Colombia has been no exception. Ernstson (2013) addresses critical geography and urban political ecology to refer to cities as highly contested spaces, where social groups strive to conquer the portion of land which can render the highest profit on capital investment (p. 9). Today, Colombian cities hold in their core historical processes of restrictions, segregations, illicit enrichment and awry promotions (Carrizosa-Umaña, 2014). The social groups that profited from economic activities in the early and mid-1900s—coffee, trade and manufacture—soon positioned themselves as new urban elites, pushing forward housing and transport projects to their benefit. In the second half of the 20th Century, illicit profits didn't take long to penetrate hilly areas as well as rich neighborhoods in the main cities, leading to the adoption of invisible governance regimes. Here, law enforcement was either absent or corrupted. Both dynamics, along with Colombia's armed conflict, reinforced segregation patterns in large cities, displacing low-income groups to remote peripheries. While shaping Cali's geography between the 17th and 20th centuries, elites reinforced unequal and oppressive social structures in the city.

In his book *Social Justice and the City* (1973), Geographer David Harvey analyzed how social and economic processes structure the actual space, leading to different outcomes in terms of territorial justice. With limited possibilities to access to land markets, poor communities end up either (i) excluded, (ii) forced to get debts in order to pursue a property, or (iii) claimed as own marginalized lands in periphery areas, generally where provision of public services is absent or highly monopolized, and/or in proximity to environmental features with negative externalities—soil and water pollution or noise congestion. As will be seen in further sections, this situation translates into proximity to high risk areas in the case study of the Meléndez River.

Outside the market domain, however, states also play a role in shaping the spatiality of a city. Sociologist Manuel Castells refers to three systems organizing the space in cities: economic, political-institutional and ideological (1986). In this context, states are called to efficiently regulate contradictions between market dynamics and social struggles. For instance, governmental institutions are responsible of appointing land for housing developments to vulnerable communities. Yet, taking Cali City as an example, the implementation and follow-up of such decisions is tenuous due to the lack of consensus with these communities, personal interests of politicians or because new owners sublet and squat other areas in the city (Uribe, et al., 2019, p. 160).

The evolution of the natural environment in Colombian cities speaks of historical social inequalities. Moreover, the case study located in the Meléndez River reflects how marginalization and natural hazards drive each other in Cali (Fig. 2). As depicted by Szasz and Mesuer (1997) "the transformations of nature will tend to occur in a way that reproduces and exacerbates existing social inequalities. In effect, environmental inequality is one facet or moment of social inequality." (p. 116). For instance, although Bogotá features one of the largest urban protected areas in Latin America—The Eastern Hills[4]—, based on an inventory of over 300.000 urban trees, Escobedo et al. (2015) found that "upper income strata have substantially better access to services provided by the city's urban forest, while lower income strata receive fewer benefits due to a smaller-sized and less dense urban trees community" (p. 1050). For instance, pollution removal potential was almost two times higher in the city's wealthiest areas comparing to the lowest socioeconomic strata. Results reveal the unequal provision of regulatory ecosystem services across Bogotá.

[4] The Protecting Reserve of the Eastern Forest of Bogotá, commonly known as The Wester Hills, holds an area of approximately 14.000 ha. The Tijuca National Park in Rio de Janeiro, Brazil has roughly 3.000 ha.

Similarly, qualitative research aiming to identify Urban Fresh Islands, IFU in Cali both for 1999 and 2011, showed IFUs followed a grouped-type spatial distribution and were concentrated in medium-high and high-income areas of the city, characterized by low-population density and excellent performance in green-areas-related metrics. Results for IFU were the opposite for low-income areas (Fernández & García, 2013).

Finally, the framework proposed by Ernstson is a way of approaching the ecology and environmental justice in cities using the ecosystem services framework. As explained by Schweitzer & Stephenson: "The term environmental justice incorporates 'environmental racism' and 'environmental classism'. It captures the idea that citizens of different races and classes experience disparate environmental quality." (2007, p. 319). This said, I intent to deliver to this framework by analyzing how actors settled in economically opposite sides of Cali City created values of their urban natures. This endorses the idea that asymmetrical power relations—conditioned by resources, skills, social capital (networks, etc.)—will also portray an asymmetrical success when it comes to popularize protective narratives. And these value-creating processes influence in turn the generation and distribution of ecosystem services across the city.

1.1.3. Both analytical modes in motion

1.1.3.1. Value articulation

Colombia has traditionally relied on state-led actions to protect nature. This practice is embodied in the identification of special 'sites', 'objects' and 'strategic ecosystems' that together assemble the so-called protected areas. Our legal framework builds upon the definition of the Convention of Biological Diversity (CDB): "a geographically defined area, which is designated or regulated and managed to achieve specific conservation objectives" (1992, Article 2). Colombian expert on biodiversity conservation, Germán I. Andrade, wrote a critical review in 2009 on how conservation measures in Colombia have entailed the exclusion of narratives and values laying outside positivist science. This approach has brought simmering conflicts in society around *who* defines *which* nature is worth protecting; and *what* values are being unduly disregarded in the name of conservation. The criteria and processes used for 'site' prioritization find their basis in a fully-supported statement of their conservation value. What this entails is a not-supported statement on the absence of value for areas discarded along the process (p. 50). This method, argues Andrade, turns into an issue of ethics, since conservation should be a collective decision, one wherein society agrees on the commitments and trade-offs carried by this or that conservation system (p. 55).

In line with this notion, Aalto and Ernstson (2017) argue it is often forgotten that ranking pieces of nature over the rest—defining it as valuable—is a sociomaterial practice itself. *Social* not only because individual attributes such as class, race or gender influence the chances a narrative have to establish, but because the flow of ideas in a specific moment of history will cultivate a context to value a piece of nature, until then unveiled. This is described by J. Pyne in his book *How the Canyon Became Grand: A Short Story* (1998), when several historical and ideological events mustered capacity throughout the centuries and ultimately created an "apparatus for valorizing" the Grand Canyon as the cultural spectacle we know today—not a scientific, artistic or geological discovery but a cultural symbol finally labored by mid-nineteen century intellectuals. Secondly, value-articulation is a material practice insofar actors employ artifacts (maps, technical reports, historical archive, etc.) to mobilize narratives of what they consider as of value. Hence, "value articulation processes are active, creative, selective and ultimately political" (Aalto & Ernstson, 2017, p. 310).

This research refers to *protective narratives* as provided by civil society organizations to explain and legitimize the need for protection (Ernston & Sörlin, 2009). Here, scientific, historical or cultural artifacts are employed and further mobilized through social arenas (see table 3). As shown in Ernstson et al. (2008), this framing process can shape a new identity towards an area but can also further impact its governance structure, for instance, new laws or management plans can be formulated in response of *protective narratives*. This research analyzes how *protective narratives* were created and mobilized in two contested and socio-economically opposite sites in the city of Cali and speculates on how these placed-based struggles impact the distribution of ecosystem services at the city level.

To this end, Ernstson's framework (2013) appeals to the Actor-Network Theory (ANT), where sociologist Bruno Latour in 1980s studied the 'making of' human agency and the role objects play within this construction. Beyond the outcome or 'official story', what comes key in this quest is the 'backstage', where we witness the connections between humans and non-humans i.e. actor-networks (Latour, 2005). Ernstson incorporates, and delimits, the ANT in his framework by understanding value articulation processes as "a political program that gains power as actors 'pick up' artifacts (often produced by other actors) and align them with their program to give it 'weight'" (2013, p. 13). For instance, the Wetlands' Foundation in Bogotá gained more power as not only 100 permanent volunteers, but 8.000 collaborators progressively supported the participatory inventory on urban wetlands. Another example is offered by El Zanjón del Burro activists who claimed this site as an important area for conservation in Cali against road works envisioned by the City Administration. This protective narrative gained more visibility

(power) as they "picked up" scientific reports developed by local universities—until then forgotten in library shelves—and brought them to different social arenas (media outlets, for example) to highlight the ecological importance of El Zanjón del Burro. The group then added value to this information by commissioning new studies to bear out the importance of an area very few people in the city knew before.

1.1.3.2. Ecological Network perspective

From a landscape ecology approach, a city is understood as an urban landscape composed by a matrix, fragments, nodes and links. Elements of an urban landscape can be exemplified as follows:

- Matrix: dominant land-use e.g. buildings and roads.
- Fragments (or patches): areas differing from their surroundings e.g. squares, parks, schools and university campus, golf courses, cemeteries, green and blue areas, etc.
- Nodes: larger fragments which could potentially host a significant number of species e.g. urban protected areas, urban forests.
- Links (or corridors): key areas enhancing species persistence between fragments and nodes e.g. creeks, streams, rivers, riparian forests or tree planting schemes along roads.

This notion spatially integrates water, biodiversity, vegetation, people, and man-made structures (Forman, 2008). Landscape ecology thus addresses not only the interactions between biological and socioeconomic components of the city, but also how the spatial arrangement of these elements has ecological consequences at different scales (Wu, 2008, p. 16).

By adopting a network perspective, one puts upfront the complexity of urban landscapes, and acknowledges that urban biodiversity hinges on biophysical processes that are now highly influenced by urban and human-dominated processes. These processes unfold across space and time and tie all pieces of nature together. In this network, the outcome is much more than the sum of its parts.

Previous to 2013, Ernstson and colleagues developed research linking ecological processes and social networks. To this end, they utilized data on functional groups, field surveys and/or satellite images and network models (Ernstson, Barthel, Andersson, & Borgström, 2010). However, in sake of this research I will apply basic ecological landscape principles to speculate how social practices impact ecological processes, therefore enhancing or hindering the ability of urban ecosystems to regenerate.

The principles selected are those of the Ecological Main Structure (henceforth, EMS) of Cali, insofar it is a top-level hierarchical planning guideline for Colombian municipalities. The EMS is in turn contained in the Land Management Plan (henceforth, POT), the preeminent legal instrument setting up land-use norms for a period of 12 years in each municipality. What the POT dictates is carved in stone, so to speak.

The EMS principles are permeability, transition, connectivity and continuity (DAPM, 2014, p. 711). Two principles from the Methodological Guide for the implementation of the Municipal System of Protected Areas of Cali (SIMAP) were also included into this research: ecosystem approach and urban-rural relation (DAGMA, The Nature Conservancy & Corporación Biodiversa, 2012, p. 28).

By doing so, this investigation develops a primary understanding of how ecosystem services—or what is socially defined as of value from nature—are embedded in a complex landscape that will influence their production.

1.1.4. Framework Operationalization

Table 3 is an attempt to synthetize the conceptual apparatus of this research. It is important to mention that the framework on *Social production of ecosystem services in urbanized landscapes* proposed by Ernstson in 2013 is the result of progressive work in this field since 2008. Naturally, references from papers as *Weaving protective stories: connective practices to articulate holistic values in the Stockholm National Urban Park* (Ernston & Sörlin, 2009) and *Scale-Crossing Brokers and Network Governance of Urban Ecosystem Services: The Case of Stockholm* (Ernstson, Barthel, Andersson, & Borgström, 2010) were taken into account to better illustrate the scope of this framework.

As such, the table is a proposal, open to contributions from future research using the *"Social production of ecosystem services in urbanized landscapes"* framework.

Table 3. Framework operationalization

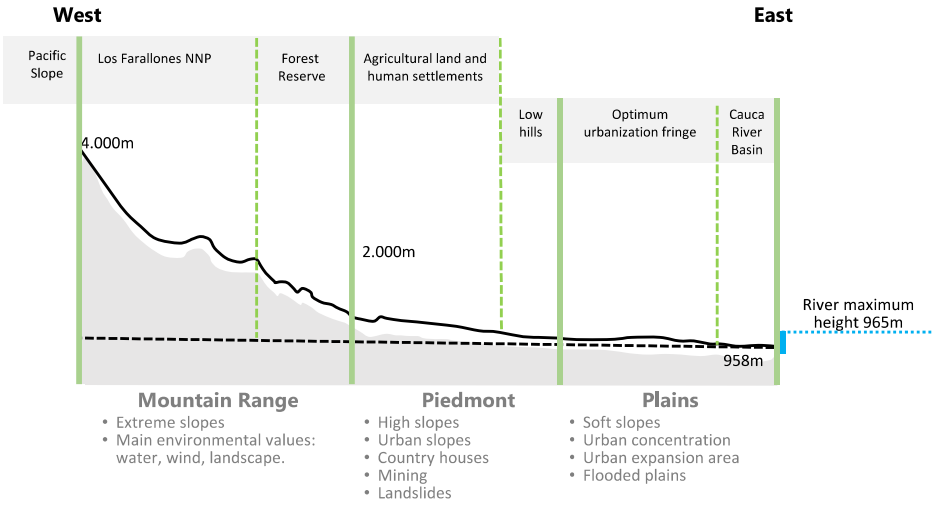
Overarching goal	Discourses	Analytical modes: Value articulation	Analytical modes: Ecological network perspective	Dimension	Description	Sub-dimensions	Description or examples
To link ecosystem services and environmental justice	Ecological complexity. Social-Ecological Systems. Critical geography and environmental justice. Actor-Network Theory.		✓	Landscape ecology	Landscape ecology allows to spatially integrate water, biodiversity, vegetation, people, and man-made structures in urban landscapes. These interactions are studied through key principles.	Permeability	Opening of man-made or semi-natural elements to assure flows and dynamics across those elements.
						Transition	Gradual change/progressive transit between natural areas and built areas
						Connectivity; continuity	Reconnecting areas of environmental 'value'; bring pieces of nature together into a physical (not virtual) continuous.
						Ecosystem approach	Sustainable use of natural resources and an even distribution of benefits.
						Urban-rural relation	Integration of both land-uses as an imperative for urban sustainability.
		✓	✓	Protective Capacity	The level of resistance to disappear as a node in the ecological network, either by being replaced by built constructions or through complete ecological degradation for some reason.	Civic processes	Lobbing Media Protests events
						Technical processes	Incorporation into strategic planning documents.
						Biophysical constrains	Examples here are how steep hills, marshes or wetlands frustrate exploitation plans.
		✓	✓	Management Capacity	The ability to carry out management practices that sustain ecological flows through individual green areas in the ecological network.	Practices implemented by civil society groups engaged with local ecosystem management	Examples are citizens who appeal to local knowledge to manage private gardens, allotment areas or gold courses (Colding, Lundberg, & Folke, 2006).
						Practices embedded in institutions and urban planning decisions	Examples are management plans for urban parks, urban protected areas, cemeteries, etc.
		✓		Value articulation (as a social practice)	A political program that gains power as actors 'pick up' artifacts and align them with their program to give it 'weight'.	Artifacts help actors to construct narratives able to describe a phenomenon, and attach and explain its value.	Scientific reports, maps, numeric values, projection of scenarios, list of species or ecosystem services, etc. Also, physical structures e.g. buildings.
						Actors related to those artifacts	Scientists, consultants, activists, others.
						Social arenas	Media, workshops, public debates, exhibitions, political debates (congress), others.

1.2. Empirical context

This research applies the framework proposed by Ernstson (2013) which ultimately links environmental justice and ecological complexity. To this end, this section introduces Cali's social-ecological profile to further relate how *protective capacity* and *management capacity* of both case study sites impact the distribution of ecosystem services across the city. For instance, to what extent local ecological processes were upheld by (i) the incorporation of the Municipal Reserve for the Sustainable Use of the Meléndez River into the POT (*protective capacity*), and (ii) local practices linked to *El Morro* ("The Hill") influencing ecosystem functioning by resisting exploitation e.g., ecological festivals, entertainment or aesthetic contemplation (*management capacity*). The role of each study case plays within the ecological network will be further referred in Chapter 4.

Cali, with over 2.445.000 people (DANE, 2005), is the third largest city in Colombia, and its total surface area is 561 km2, of which 21% is urban and 79% rural (DAPM, 2014). The city is located at an elevation of 1.080 m.a.s.l. and has a tropical savanna climate according to the Köppen classification systems; temperature average is 24° C and total average annual precipitation is 1173 mm. Cali is settled in a valley of southwestern Colombia between the western and central chains of the Andes, and its urbanization pattern stretches from the slopes in the west to the relatively plain zones in the east and south. Figure 1. summarizes some of the environmental and urban features of Cali based on its three main landscape units: slopes, piedmont and plains.

Figure 1. Landscape units of the municipality of Cali



Adapted from the POT (DAPM, 2014, p. 88).

The city is divided into 37 areas: 22 located in the urban area (henceforth termed *comunas*), and 15 refer as rural (*corregimientos*).

During the 16th and 19th centuries Cali was a crossroad-type city in proximity to the port of Buenaventura on the Pacific coast (Arteaga, Escobar, & Moncada, 2018). The city connected the Capital City of Bogotá to the coffee regions to the Pacific Ocean. Afterwards, the 20th Century brought the seeds of urban transformation to the city: in 1910 Cali was appointed as the capital city of the Valle del Cauca region; the Pacific Railway was built in 1915; between 1944-1967 the city experienced its first wave of industrialization (Becerra, 2014); and by the mid-60s it became a receptor city of displaced communities forced to flee their villages due to our armed conflict. Afro-Colombian migrants settled by the Cauca River due to their fishing nature, whereas indigenous communities occupied uphill areas, staying true to their laborer tradition. The open-minded *caleño* culture is thus the result of a vigorous convergence of the indigenous, African and Spanish traditions.

However, Cali's urban development in the 20th Century is embedded in historical dynamics of labor exploitation and the trade of goods and commodities. The historical concentration of land by elites undoubtedly made of Cali a highly segregated city in the 21st Century.

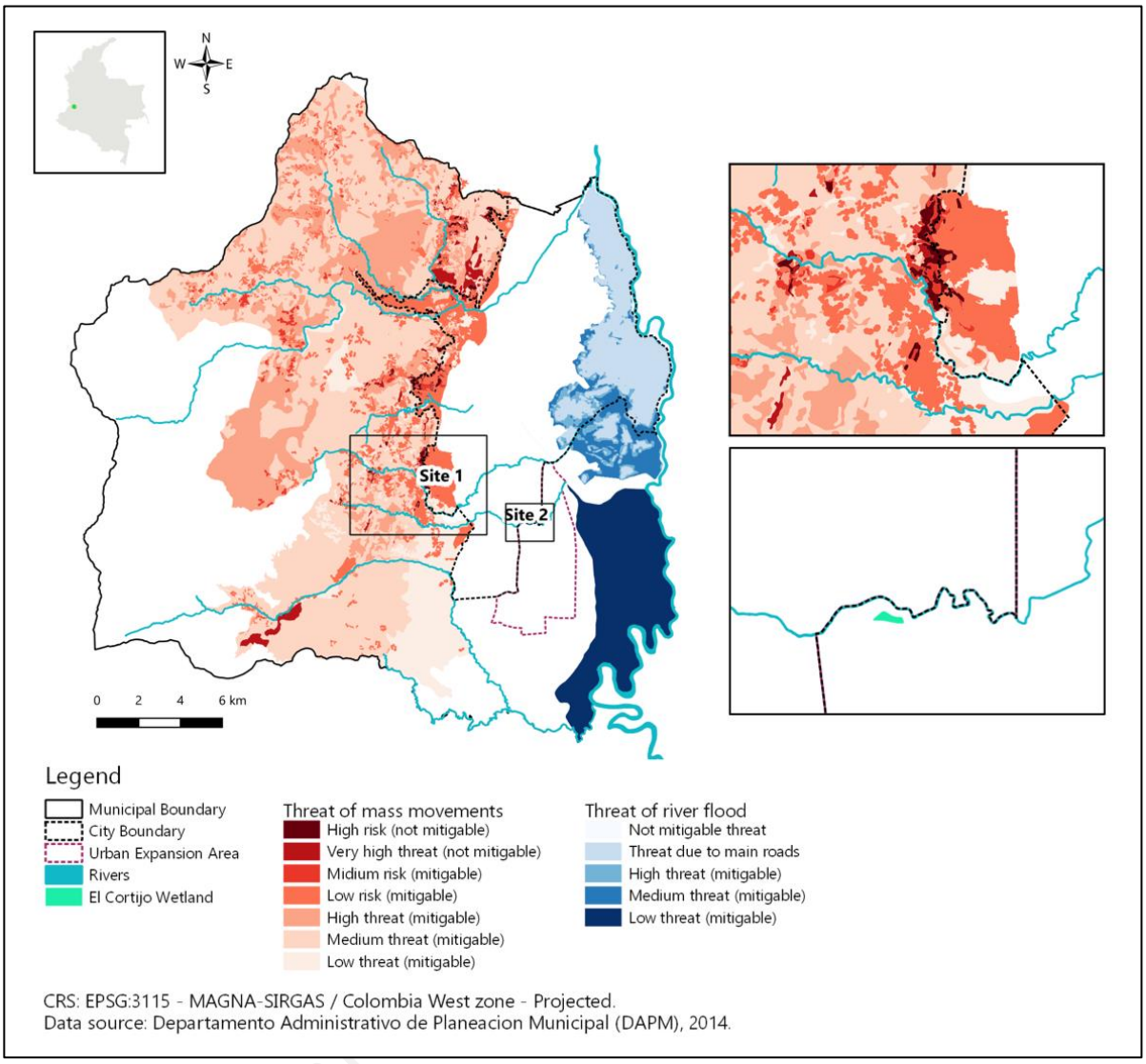
Economic activities in pre-industrial times were linked to gold mining along the Pacific coast during the 16th and 17th centuries (Moreno-Vergara 2017) and large cattle ranches and *haciendas* at some heights of the West Andes Chain during the 20th century (Raymond, 1952). This was followed by the boom of the sugarcane agroindustry in the 1940s along the geographic valley of the Cauca River (Vásquez, 1990; Correa-García, Vélez-Correa, Zapata-Caldas, Vélez-Torres, & Figueroa-Casas, 2018). These economic activities were driven by indigenous communities deprived from their lands (*resguardos)* and re-organized under the *hacienda* scheme, on one hand, and black communities brought from Africa to America as slave labor on the other (Uribe, et al., 2019).

After the abolition in 1851, free minorities occupied the surrounding land of the *haciendas* they once worked for (Mina, 1975). Black communities progressively consolidated peasant economies based on corn, banana, cane, tabaco, coffee, cocoa and other crops, hence contributing to boost the urban economy of Cali, especially between 1900 and 1930 (Urrea, 2011). Meanwhile, buoyant elites used their prestige, power and ability to make decisions to keep adding wealth and land in Cali. Powerful landlords pulled off road infrastructure projects while monopolizing water, energy and aqueduct (Uribe, et al., 2019, p. 9). All of this was done in the name of 'modernization' and with considerable assistance, of course. Elites gained support from the state through policies, laws and national and international loans.

But it was in 1971 when the Pan American Games kicked off that Cali positioned itself as a promising city to venture into industry, business, sports, literature and music; and graced by an outstanding nature. Although the city seemed to offer a place for everyone, Cali's geographies rapidly reinforced historical dichotomies like the formality-informality, black-white or poor-rich—intensified from the 1980s onwards. With the 20th Century's wave of urbanization, new plots were appointed for residential and commercial purposes, rising the value of urban land thereby displacing low-income communities from the center to the periphery areas (Calero, 2018).

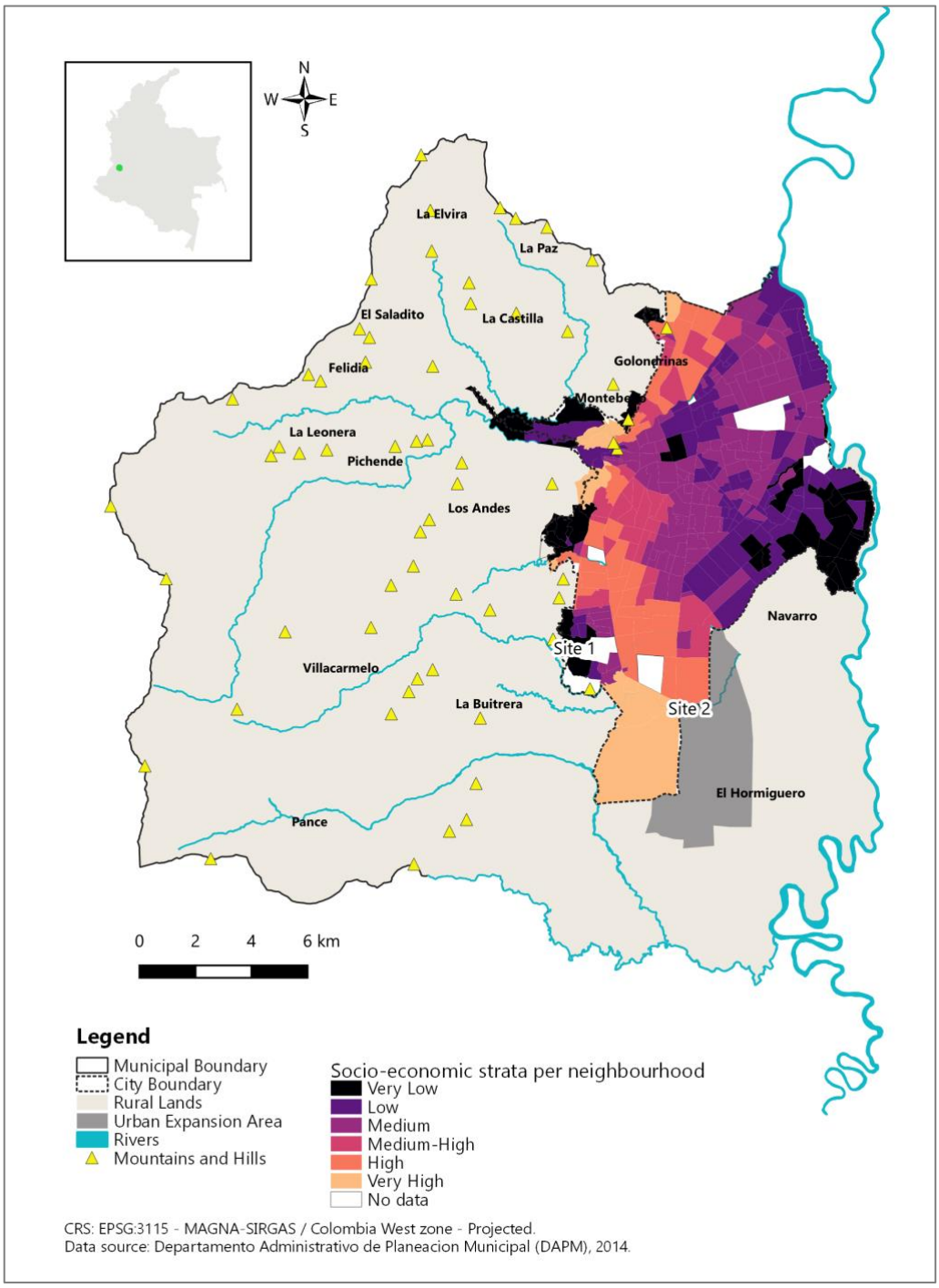
Power asymmetries based on race or class are still palpable in Cali's spatiality as families who accumulated wealth in previous centuries still holding significant fractions of land. Furthermore, these powerful landowners are also real estate agents, making it hard to assure public interest over individual aspirations. After 1960s, Cali underwent a critical period where the modern city paradigm clashed with the rapid, desperate response by less-favored classes (Torres, 2009, p. 145). Spatially speaking, the city started the 21st century with what Professor Luis Carlos Castillo called the "racealization" (*racialización*) of the space, this is the localization of poor classes in high-risk areas in the periphery of Cali (Castillo, 2005).

Figure 2. Risk of landslides and river floods at case study sites and throughout the municipality of Cali.



In Colombia, socio-economic strata are defined on a scale from 1 to 6, where 1 denotes urban areas of very low-income housing, unpaved roads and low access to urban infrastructure (water and electricity access, sewage, etc.), while 6 represents high-income housing access to very well-developed infrastructure and utilities (Escobedo, Clerici, Staudhammer, & Tovar, 2015). According to the City Administration, strata 1 and 2 areas are mostly located in hilly areas in the west of the city (*comunas* 1, 18 and 20) or in the eastern plains facing the Cauca River (*comunas* 13, 14,15 and 21).

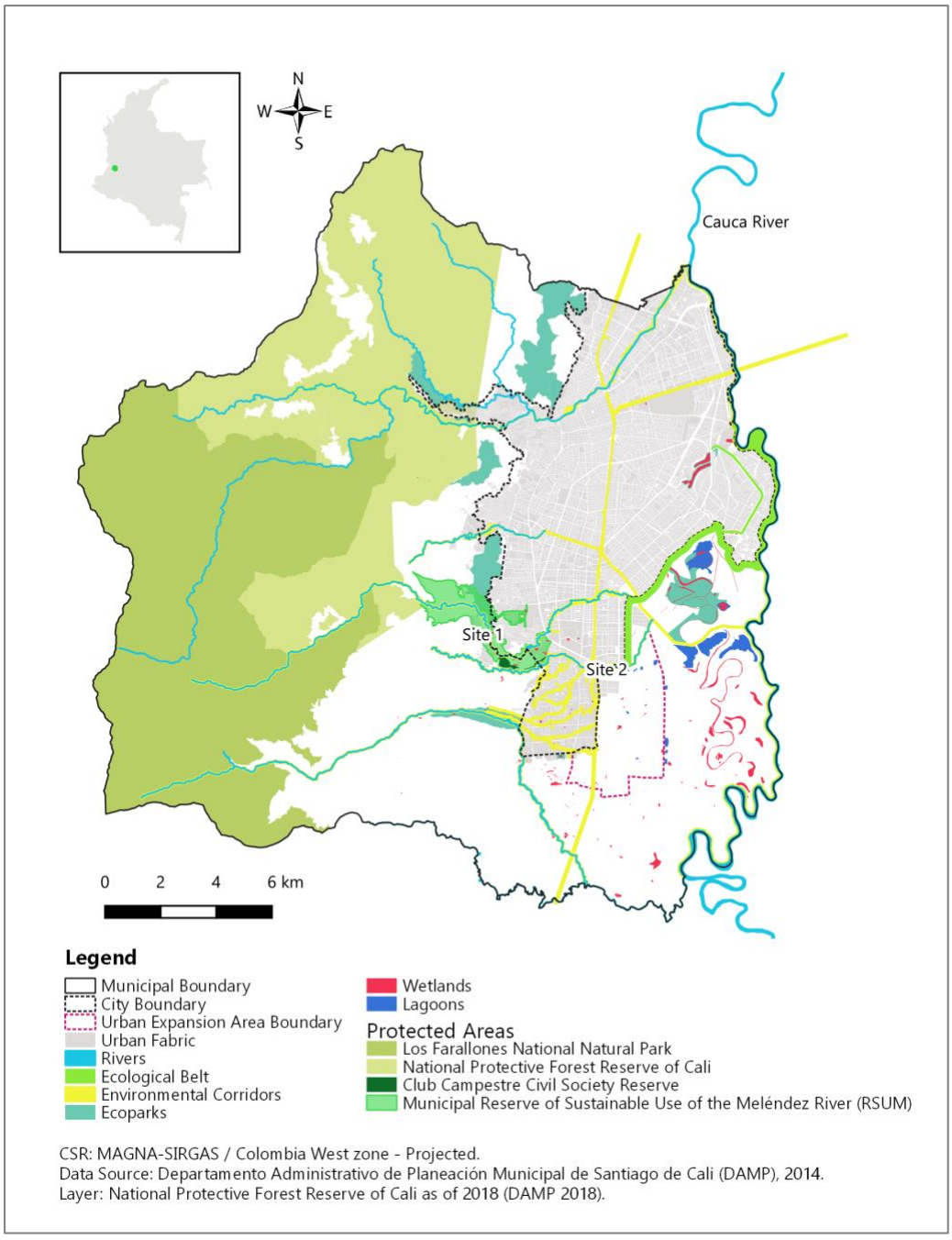
Figure 3. Socio-economic strata in the urban area of the municipality of Cali



At first sight, the components framing Cali's landscape are Los Farallones National Natural Park, the Forest Reserve of Cali and six urban rivers originating in the western chain of the Andes. The Cauca River, second largest river in Colombia, completes the picture with quite ostentation in the eastern border of the city. In this sense, six urban rivers act like natural corridors and could potentially (re)establish a west-to-east connectivity at different scales: either integrating lineal parks to wetlands in the urban fabric, or more ambitiously, connecting two biodiversity hotspots beyond the city

borders—the Chocó biogeographic and Tropical Andes regions. Part of the field work conducted in Cali was precisely dedicated to understand both the official and non-official actions toward the city's rivers. While it is true that City Administration plans elevate the role of rivers as environmental corridors, on the ground, advocates state this position has come short oftentimes, as environmental authorities "have no teeth". They fight for the restoration of the rivers while other actor groups meticulously study how to avoid law enforcement in the riverways.

Figure 4. Key elements of the Ecological Main Structure (EMS) of the municipality of Cali



These massive natural elements (Los Farallones, the Forest Reserve and all seven rivers) along with local protected areas, eco-parks, green areas (>2ha), green belts and riverbanks are assembled under the EMS. The EMS concept originally privileged biodiversity conservation over environmental and social functions and was introduced to national planning policy in 2000 (Andrade, Remolina, & Wiesner, 2013). Over time, a few Colombian cities have challenged the EMS concept by exploring more comprehensive and reconciliatory approaches to understand nature in human-dominated environments (Instituto Humboldt, 2017). For instance, some municipalities have complemented the EMS by adding the Ecological Complementary Structure, thus moving towards a more 'urban' assembly including public space elements, urban facilities and mobility axes. Overall, the EMS has reached consensus as a top-level planning instrument for municipalities, yet its real-world implementation has been traumatic. Ultimately, the EMS lands in a complex social setting ruled by contested preferences (values) and social inequalities (Andrade G. I., 2009; Andrade, Mesa, Ramírez, & Remolina, 2011). Additional challenges are conflicting interpretations of the EMS concept and the lack of a leading institution capable of linking different scales of governance (Andrade, Remolina, & Wiesner, 2013). Cali City is no exception in this regard—both case studies portray such confrontations.

1.3. Objectives

The overarching aim of this research is to evoke an understanding of how value-creating processes—embedded in contexts of power—relate to the generation and distribution of ecosystem services at the city scale. To this end, I followed a case-study design (Yin, 2014) by choosing two economically opposite sites in Cali, and reconstructing their *protective narratives* based on information from interviews, participatory observations and documents analysis. This comparison sought to link environmental justice and ecosystem services as "not all communities or individuals have the same structural possibilities to engage in the process of constructing values" (Ernston & Sörlin, 2009, p. 1463). All in, this investigation marries a complex view of power with the ecology of the city. Specifically, this study aims to:

- Reconstruct *protective narratives* in two highly contested and economically opposite sites in Cali, Colombia.
- Analyze how value articulation processes yield protective capacity and management capacity in both case studies.
- Conjure up how these place-based struggles impact the ecological outcome of the city, this is, the generation and distribution of ecosystem services.
- Discuss to what extent the evidence from this study contributes to the framework under reference.

2. Methods

2.1. Methodology

This investigation used case study as the main research strategy. As explained by Social Scientist Robert K. Yin, case studies make possible to understand complex social phenomena, and "to retain the holistic and meaningful characteristics of real-life [contemporary] events" (2014, p. 2). Naturally, this strategy overlaps with others (archive or historical analysis, for example) but holds two distinctive sources of evidence: direct observation of the events and interviews with the actors involved in those events (p. 8). In terms of design, this research developed a multiple-case design to predict contrasting results for a theoretical replication (p. 47), in this case the framework explained in Section 1.1. Theoretical Context. Expanding on this research strategy, Bennet & Elman find cross-case comparisons an advantageous choice, especially when (i) concepts or theories aren't yet fully validated; and (ii) the research places equal attention to understanding how casual mechanisms operate within individual cases as well as generalizing them across broader contexts (2006, p. 468).

Case studies were chosen for their ability to demonstrate value-articulation processes. Cases were meant to be highly contested, located in opposite socio-economic strata in the city and have accessible evidence. By evidence I mean archive as well as easy-to-trace leaders, artifacts and social arenas. The selection was done based on news archive, consultation to thirteen experts on urban environmental conflicts and/or environmental activism in Cali, and knowledge gained from my previous experience in urban biodiversity in Colombia.

The round of consultations led to identify ten urban environmental conflicts in Cali City[5]. For most of the cases, experts mentioned social mobilization was not clear or easy to grasp. El Cortijo Wetland was mentioned 60% of the times whereas additional plights were only mentioned 20% or 10%. This case was located in an area of economic strata 5 (where 6 represents high-income housing access as explained in section 1.2. Empirical Context) and it was supported by a fair record of news archive, artifacts and social arenas.

Interestingly, the social mobilization related to the Meléndez River, a process employing quite a set of artifacts and social arenas since 2006[6], was not identified as a case of

[5] El Cortijo Wetland; Pance River, El Jarillón, former dumpsite Navarro, Siloé, Los Farallones National Natural Park; Corregimiento El Hormiguero; La Babilla Wetland and Las Garzas Ecopark; El Pondaje Lagoon and Charco Azul Wetland; and *acueductos comunitarios* (or water-user associations).

[6] For example, a Popular Action filed in 2006, a 5.000-people mobilization known as the "Carnival for Life" (*Carnaval para la vida*) to make visible the need for protection of the river, scientific reports by NGOs, among other artifacts.

contested nature against development pressures. However, based on a large repertoire of civil claims, news archive and scientific reports (see Annex 1) and my previous experience in Colombian cities, this struggle—located in an average area of strata 2—was deemed suitable for comparison purposes against El Cortijo Wetland and its rising visibility.

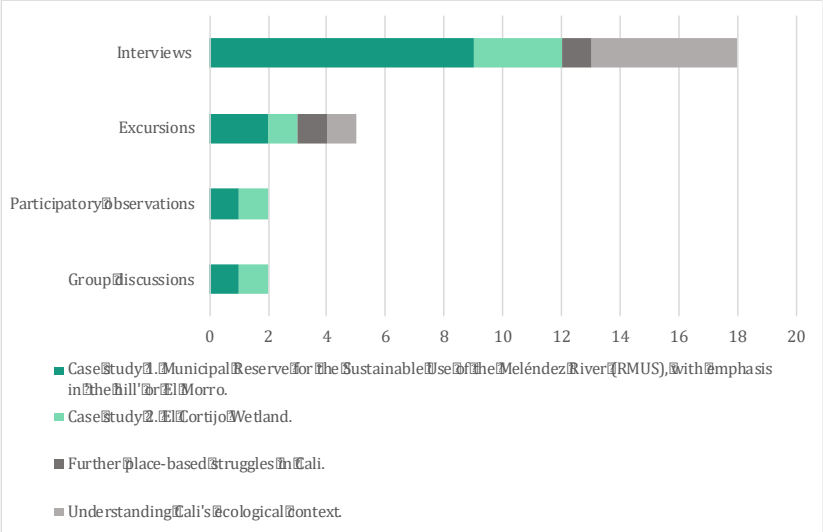
Research covers a timeframe of twelve years for the first case study (2006-2018), Municipal Reserve for the Sustainable Use of the Meléndez River (RMUS), and two years for the El Cortijo Wetland case (2017-2018). Initially, the former was supposed to only cover from 2013 to 2018 since it was in 2013 when locals, the City Aministration and two non-profit organizations came together to identify conservation objects in the river's medium-low basin. However, the designation of the RMUS is explained by social mobilizations tracing back in 2006. In addition to ecological values, it was the aggregation of civil claims that made the environmental authority of Cali City to turn eyes towards the Meléndez River.

2.2. Data collection

Data collection was based on qualitative interviews, group discussions, participatory observations, field excursions, historical and news archive, social media, and reports from the City administration. These methods are outlined below.

Field work was conducted in Cali in November 2018; a total of 18 interviews, 2 group discussions, 5 field excursions, and 2 participatory observations were done during this period. Data collection and analysis were undertaken in Spanish. Annex 1 provides a description of the empirical material of this research.

Figure 5. Qualitative methods applied per study case and further research aims



2.2.1. Interviews and group discussions

This research applied qualitative interviews. According to Bryman (2012), 'qualitative interview' is a term that commonly includes both semi-structure and unstructured interviews. On one hand, semi-structure interviews are typically based on a series of questions in the general form of an interview schedule, in which the interviewer can vary the sequence of questions. Normally, questions are "somewhat more general in their frame of reference from that typically found in a structured interview schedule (…) and the interviewer usually has some latitude to ask further questions in response to what are seen as significant replies" (Bryman, 2012, p. 212). On the other hand, unstructured interviews are commonly built upon a list of topics and usually the questioning style is informal. "The phrasing and sequencing of questions will vary from interview to interview." (p. 213). Qualitative interviews were therefore chosen as the suitable method since interviewees belonged to a wide range of backgrounds and social groups. For example, some were social leaders, professors who were also activists, or technicians linked to the City Administration or NGOs. Thus, the sequence of questions, type of questions and language, etc., demanded flexibility.

The interviewees were chosen based on news archive, consultation to experts and previous knowledge of my experience in urban biodiversity in Cali. Foreground activists who signed objection letters or legal claims were identified from interviews in media, and newspaper articles. In regard to those leaders 'behind the scenes', *Corporación Biodiversa*, professors in Universidad del Valle and local experts in urban planning facilitated a number of key connections.

Few more interviews were conducted to City advisors and advocates from different mobilizations to deepen understanding about the urban ecology of Cali and to refine themes resulting from the exchange with the core leaders.

Second, the purpose of group discussions was to gather leaders who represent certain identity: for instance, current members of *Apromeléndez* (first study case), while leaders acting from individualistic fronts were addressed in interviews. The same rationale applied for the second case study. The entry point for group discussions was to listen to the story of participants about their common experience. According to Bohnsack (2010), the role of interviewers in group discussions is to make explicit the framework of orientations or general patterns implicit in the depictions given by participants across different topics (Bohnsack, 2010, p. 104) and keep the self-dynamics of the discourse (see also Bohnsack 2008).

For instance, the idea that advocates for the Meléndez River articulated demands for social justice through environmental imperatives came out while they explained their common story, yet a claim for social justice was not addressed as such along individual interviews. Group discussions therefore helped to understand the viewpoints of those who shared an organizational identity.

2.3. Data interpretation

Transcripts were done in nine of the cases (core leaders) and for the rest of the interviews and group discussions, content description—a compilation of key ideas. Interpretation was based on grounded theory, specifically, the open coding method. This procedure helps to conceptualize the phenomenon under consideration based on empirical data (Strauss & Corbin, 1990). Steps included: (i) examining interviews and group discussions and choose relevant expressions, (ii) analyzing and comparing those expressions, (iii) building analytical categories, (iv) create a list of conceptual categories, (v) conducting further interviews to refine these categories, (vi) studying reports, news archive and city plans to better place the analytical categories.

Categories for the study case of the Meléndez River and *El Morro* were environmental history, land misappropriation and livelihoods. This case demanded considerable efforts to systematize and then compare different views towards the river: values, actor groups, and actions taken, especially since 2006 (Fig. 9.). For the second case study, El Cortijo Wetland, categories were environmental history, biodiversity conservation and urban planning policies. The theoretical framework of this research i.e., ecological complexity and value articulation, alongside these categories served to integrate the analysis. Final results were translated to English, however, quotations from the interviews and group discussions are also shown in Spanish to offer a sense of transparency to most of the activists interviewed.

2.4. Case study sites

2.4.1. The Meléndez River and *El Morro*

An eight-year mobilization claiming the preservation of the Meléndez River encouraged the City Administration to designate Cali's first urban protected area in 2014—the Municipal Reserve for the Sustainable Use of the Meléndez River (RMUS). Yet, for some leaders this victory entailed a fraction of failure since the process wiped out a highly valued area by locals: *El Morro* ("The Hill"). This area was already compromised for develop low-income housing projects promoted by both the National Government and private developers. These projects are commonly known as *Macroproyectos* and they are considered a national priority, meaning they could surpass local priorities. On the other hand, leaders holding a preservationist view think the creation of the RMUS completely deviated attention from the hot topic: to resettle people living by the riverbanks and ensure ecological restoration. Today the River is still one of the most contested places in the city—three major housing projects are still on hold, as water shortages keep occurring during dry season and hard-to-beat mafias continue to profit from selling lots they previously squatted.

Figure 6. The RMUS placing emphasis on *El Morro*

Left: The RMUS is outlined by a semi-transparent polygon. Here it can be seen how the reserve was thought out as a strategy to hold back urbanization, as it traverses the urban-rural border in south-west Cali. **Right: (1)** *El Morro*. Santa Elena's second phase is envisioned in the upper part of the hill. Lower plots belong to private constructors (Cusezar and Marval). **(2)** Santa Elena's first phase took place in this hill. **(3)** 'Club Campestre' Civil Society Reserve. In the 'urban' RMUS, three major green areas with significant forest coverage appear: *Club Campestre*, Pichincha Military Complex and *El Morro*, yet only the latter has public access as it is part of the "Zone for Public Use in the Rivere of the Meléndez River" (Municipal Agreement 059, 1968). This bit of the story is crucial if one is to address environmental justice in relation to ecosystem services in *comuna* 18. Photo from Google Earth Pro (January 2018) with edits by the author.

- Object of study: Municipal Reserve for the Sustainable Use of the Meléndez River (RMUS), with emphasis in *El Morro* ("The Hill") struggle.
- Location: *comuna* 18 (urban) and *corregimiento* La Buitrera (rural).
- Socio-economic strata (mode): 2, low class in *comuna* 18.
- Period analyzed: 2006-2018
- Site extension: 610 ha
- Main values: hydrological network, relicts of Tropical Dry Forest, *Ortalis Columbiana* or *guacharaca*, historical-cultural and environmental memory.

2.4.2. The Cortijo Wetland

Six kilometers east from *El Morro* rises a citizen struggle to protect El Cortijo Wetland against the construction of the South Transport Terminal of Cali, expect to benefit 600.000 potential dwellers in the urban expansion area of Cali, plus roughly 75% of the Cali's student population (interviewee 18). In May 2017, residents in the nearby areas hastily reacted when a few containers appeared in the open field their kids use to play, and they enjoy for jogging or walking the dogs. Within a period of 3 months, this struggle was massively placed as one of the main environmental conflicts in the city. Until the moment this research was completed, construction works were provisionally blocked.

Figure 7. Area where the South Transport Terminal is projected

Left: Southern Cali, right where the area of urban expansion begins southwards. The area compromised by the South Transport Terminal is emphasized. **Right**: **(1)** El Cortijo Wetland. **(2)** The river's left margin is located in Cali's urban area whereas its right margin is on the urban expansion area, meaning two different environmental authorities are involved. **(3)** Remnants of Tropical Dry Forest. **(4)** Tree felling in this area was possible because this plot was owned by a different person and had a quite different juridical history comparing to El Cortijo's plot. Photo from Google Earth Pro (October 2018) with edits by the author.

- Object of study: El Cortijo Wetland and its area of influence.
- Location: Corregimiento El Hormiguero (rural).
- Site extension: 6.3ha.
- Location of the struggle: Comuna 17 (urban).
- Socio-economic strata (mode) of *comuna* 17: 5, upper-middle income class
- Period analyzed: 2016-2018
- Site extension: 6.3ha
- Main environmental features: Lili River, relicts of Tropical Dry Forest, birds.

3. Results: protective narratives

3.2. The Meléndez River and *El Morro*

3.2.1. A joyful yet conflicting place

Between 1940-1980 the Meléndez River was by far the City's entertainment gem. In the beginning only few and non-pretentious Salsa clubs or *bailaderos* stood by the riverbanks, offering families open areas to set up the *sancocho*[7] and a dip into the water right before dancing at *Las Delicias* or *El Aguacate*. The 50s and 60s brought glory days to the Meléndez River. The historical importance of the river lies in the fact that rivers and music are in the DNA of the *caleño* culture. The city has been attributed names honoring its riverways and mountain breezes—City of Waters (*ciudad de las aguas*) or Heaven's Branch on Earth (*la sucursal del cielo*)—and *caleño Salsa* music is now a national intangible heritage. However, when the city became popular it was clear the Meléndez River was much more than just a day-trip destination. People progressively settled in, from the plains then ascending to the slopes, and within a span of 40 years ten neighborhoods were stablished[8].

Figure 8. Historical archive of the Meléndez River

f.l.t.r.: Luis Escobar diving into the river (1948), the Vives Family cooking for their *Paseo de olla* (1948), the Muñoz Family (1956), Salsa night by the river (1983). Photos hosted by Universidad ICESI's digital library **(2014)**.

[7] *Sancocho* is a Colombian popular strew.
[8] The neighborhoods were: *Meléndez*, *Buenos Aires* and *Caldas* (1940); *Alferes Real*, *Horizontes* and *Farallones* (1950); *Jordán* (1965) and the initial foundations of the *Alto Polvorines*, *Alto Meléndez* y *Los Chorros* were witnessed in 2007 (Departamento Administrativo para la Gestión del Medio Ambiente (DAGMA); Fundación río Cauca, 2007).

In the 80s, *Los Chorros* neighborhood was consolidated followed by *Las Palmas 1*, *Palmas 2* and *La Choclona*. One of the interviewees remembered that by 1998, three to four families would arrive per day to settle in the medium-low basin of the Meléndez River (interviewee 4), and informal settlements were still climbing up the slopes by the moment this field work was completed—*Las Banderas* Eco-Park, a hill close by *El Morro*, was partially burnt during an invasion attempt in February 2018 (El País, 2018). The 80s was the turning point for the river, the increasing pollution made *caleños* shift their attention towards the Pance River this time.

This occupation pattern overcame the ability of the administration to enforce national and local acts. An example are the *Ejidos*, an institution inherited from the Spanish Crown in which significantly large portions of land in Cali were commissioned for recreation purposes, as well as a "pantry" for crops and firewood (Corrales, 2014). Overtime, this public land ultimately disappeared. A wide range of actors—from well-off families to vulnerable communities and minorities, organized crime organizations, mafias, drug-related gangs and guerrilla groups—ended up establishing in this territory (interviewees 4, 6, 25, 26, 27).

Last settlements are located in high-risk areas of mass movements (highest points of *comuna* 18), some even classified as non-mitigable-risk zones (Fig. 2). Systematic deforestation and pollution have caused soil erosion (DAGMA, The Nature Conservancy & Corporación Biodiversa, 2012), and traces from old coal mines in La Antena Hill, La Bandera Ecopark and La Choclona (CVC, 2018)—including a few which are still active today—are quietly driving the river underground. Moreover, the sinkholes have led the river to disappear three times (1975, 1982 and 2009), because as the riverbed collapsed, the Meléndez turned into an underground river for a few hours (interviewees 4, 5 and 27). Some leaders define this as a countdown for a human tragedy, intensified by climate events as La Niña.

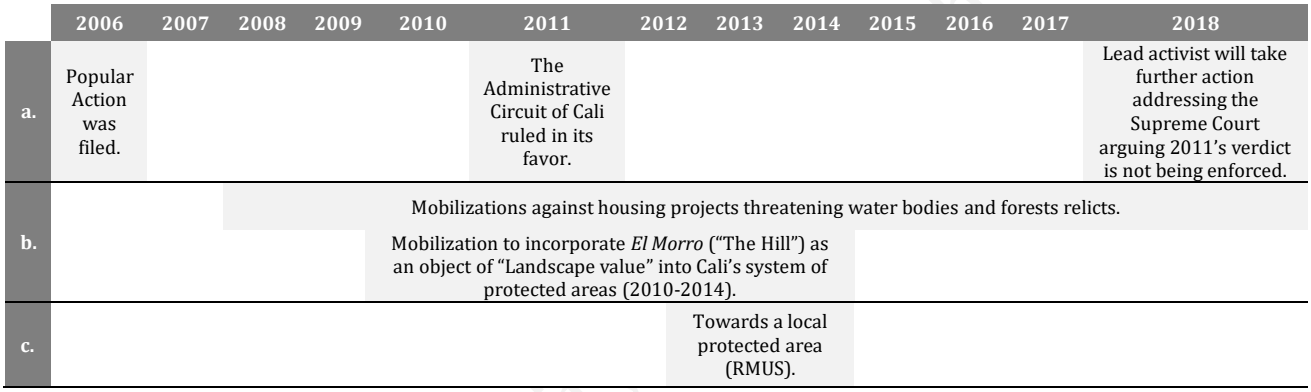
3.2.2. Claiming back the river: three visions, one river

Two of the experts interviewed—who were linked to the City Administration back in 2013 and supported the designation of the first urban protected area (RMUS) from different fronts—agreed the RMUS' process was a platform upon which the community reconciled internal confrontations in sake of the protection of the river (interviewees 9, 23). This was achieved, they think, thanks to the role of the non-profit organization taking part in the characterization of the area (interviewees 8, 9 and 22). Following Ernstson et al. (2010), *Corporación Biodiversa* (non-profit organization) could be seen here as a scale-crossing broker, as it linked the community and the environmental authority, actor

groups which "(…) through their social practices, interact with ecosystems processes at different ecological scales, and through that gain scale-specific and place-specific knowledge and information" (p. 4).

However, two interviewees also agreed that the lack of a more cohesive vision to pull off challenges such as *El Morro* struggle reinforced old disagreements and even created new frictions once the area was designed for sustainable use (interviewees 8, 23). What follows is a summary of how different visions emerged and how they converged under some circumstances, but mostly diverged soon after the RMUS was designated. Diverse cultural and ecological values have orbited *El Morro* for 13 years now but unfortunately, these progressive efforts seemed insufficient to halt housing projects.

Figure 9. Social mobilizations related to the Meléndez River



a. **Popular Action (2006).** In 2006 two citizens filed a Popular Action arguing both the environmental authorities of Cali and the *Club Campestre* violated the right to a healthy environment and claimed authorities to clear and restore the riverbanks, and resettle communities living in high-risk areas in *comuna* 18 and *corregimiento La Buitrera* (Sierra & Sánchez, 2006). According to both claimants, this was the first Popular Action advocating for a river in Colombia, as it didn't refer to the right of citizens to access to water, but it rather claimed the right of the river itself (interviewees 5, 6). In 2011, the Administrative Circuit of Cali ruled in favor of this action and issued a sentence obliging authorities to solve immediate problems within a year and restore the river's ecological and environmental functions by 2028 (Juzgado 2, Administrativo de Cali, 2011).

Since 2009, further social mobilizations—not always aligned—put more red flags around the river. As explained by interviewees 9 and 22, both ecological attributes and social pressure over environmental authorities explained why the municipality placed eyes on the river in 2013. This is the reason why the protected area designated in 2014—RMUS—, and the consequent struggle for *El Morro* need to be traced back in 2006.

The verdict from the Administrative Circuit of Cali has been the most powerful artifact to protect the Meléndez River so far. However, it has confronted those keen to recover the riverbanks—demanding more structural solutions—and those who acknowledge they were part of the problem (as informal settlers) but most importantly, they are part of the solution. People standing in the latter group believe they can play an active role in restoring the ecological functions of the river now that the RMUS is in place (participatory observation 1).

> "*Cuando nací íbamos a bañarnos al río. Esa es la razón por la empecé esta lucha, porque sueño con disfrutar el río pronto, en toda su cuenca. Yo amo los pájaros, el río… Mire hasta dónde he llegado, yo estoy orgulloso de ese fallo y ahora no me puedo rendir, tengo que seguir. No puedo ceder, porque si cedo se me desborona toda mi lucha (…) Y esto lo hago por el río, pero también por la gente que hay que reubicar que en cualquier momento pasa por una tragedia… por la Niña (…) Y mire, si nosotros logramos hacer cumplir el fallo los otros ríos de Cali se salvan porque ya el gobierno tiene que desembolsar plata para cumplir la ley.". Entrevistado 5.*
>
> [translation] "When I was born, we used to take baths in the river. That's why I embarked myself in this struggle, because my dream is to enjoy the river in its entire basin sometime soon. I love birds, the river… Look what I have achieved, I'm proud of this verdict and now I can't step back, I have to keep going. I can't resign because if I do, my entire struggle goes to waste (…) And I do this for the river but also for the people who need to be resettled because anytime now they can experience a tragedy… because of La Niña (…) And look, if we make the verdict to be enforced, the rest of the rivers in Cali are saved because the government now has to invest money to enforce the law." Interviewee 5.
>
> *"Nosotros no estuvimos de acuerdo con eso, con la RMUS como una respuesta a la Acción Popular de 2006 y por eso nos retiramos del comité. Por ejemplo, la declaratoria decía Reserva de Uso Sostenible ¿Qué quiere decir eso? 'Sigamos usándolo, pero de una manera sostenible'. El término "sostenible" es muy ambiguo acá… porque ¿quién define qué es sostenibilidad? ¿cómo garantizamos que haya sostenibilidad con uno u otro plan de gestión? La única manera, como yo lo veo, es la parte de preservación, ni siquiera conservación. Preservar lo queda y empezar a restaurar lo que se ha ido deteriorando porque si no, tarde o temprano la presión antrópica va a acabar con los ecosistemas (…)". Entrevistado 6.*
>
> [translation] "We did not agree with the RMUS as a way to tackle the Popular Action of 2006 and that's why we withdraw from the committee. For instance, the

area [RMUS] was designated as Reserve for the Sustainable Use. What does it mean? 'Let's keep on using it, but in a sustainable way'. The term "sustainable" is very ambiguous here… because who defines what is sustainable? How do we guarantee sustainability with this or that management plan? As I see it, the only way out is to think about preservation, not even conservation. Preserve what's left and restore what has been destroyed. If we don't do this, sooner or later, anthropic pressure will destroy these ecosystems (…)". Interviewee 6.

"Hablan del uso sostenible, pero nos lo quieren meter en la reserva forestal para poder legalizarle los predios a los terratenientes que se están robando la reserva forestal (…) Ellos justifican que explotan los recursos naturales en una forma sostenible, supuestamente generando poca contaminación.". Declaraciones hechas por el entrevistado 5 en un video grabado por Sintraunicol, 2016.

[translation] "They want to impose to us an idea of "sustainable use" in the forest reserve to legalize the landowners who are stealing the reserve from us. (…) They justify the exploitation of natural resources in a rational way, supposedly generating low levels of pollution.". Interviewee 5 in a video recorded by the Trade Union of University Workers of Colombia (Sintraunicol, 2016).

Table 4 Artifacts, social arenas and actors linking both (case study 1, mobilization 1)

Created artefacts	Juridical processes together with rightful claimants (Popular Action)
Other artifacts	National acts.
Actors	Legal advisors who voluntarily supported the process. Activists
Social arenas	Rallies in the neighborhood Site visit with Trade Union of University Workers of Colombia (Sintraunicol).

b. **Housing projects and the beginning of *El Morro* struggle (2008-Present).** In 2008, the Environmental Territorial Commission, CAT and the Communal Action Board, JAC of *comuna* 18 confronted *Altos de Santa Elena*, a low-income housing project known as *Macroproyecto de Vivienda de Interés Prioritario*. The *Macroproyectos* were led by the national government and this in particular was set as a national priority in 2007 (Resolution 2503, 2009; CONPES 3476, 2007). Initially, *Altos de Santa Elena* envisioned 2.300 habitational units located in two hills at the Meléndez River medium basin: western hill (stage 1) and eastern hill or *El Morro* (stage 2). Up to 2017, the project gradually granted ∽400 apartments to low-income families exposed to natural disasters in Cali e.g.,

El Pondaje Lagoon, *El Jarillón* and *Palmas 2* (El País, 2017; El País, 2011). Two more urbanizations promoted by private developers were also addressed by these claims.

Figure 10. Both hills throughout time. *Altos de Santa Elena* (stage 1) took place in the western hill. *El Morro* is the eastern hill.

July 2007 September 2017

On one hand, the community claimed that at least five neighborhoods from *comuna* 18 were already experiencing water shortages during dry seasons and that 960 new apartments (stage 1) will put unprecedent pressure upon the river. For instance, in September 2012, 200.000 people from *comuna* 18 and *comuna* 20 could only access water 2 hours per day for one month (El País, 2012); and in July 2017 EMCALI, the public services agency, activated a contingent plan because the river flow was 200 l/s below the minimum level required to supply water to communities 24 hours per day (El País, 2017). Water supply problems in *comuna* 18 have been largely documented by local press since 2011: claims by residents, protests and traffic blocking (2009 and 2011) and even an initiative from 15 Councilors of Cali in which they required the Controllership to take immediate action to solve water shortages in the area (Noticiero 90 minutos , 2012).

Since 2008 until the moment field work was completed in 2018, community leaders (interviewees 1, 3 and 4) addressed a colossal number of objection letters to the City Administration requiring detailed information about the environmental licenses granted to Cali's Social Housing Department to push forward *Altos de Santa Elena.* Based on their historical memory of the site and relying on technical concepts issued by DAGMA (2009 and 2012), activists warned the City Administration about environmental abuses taking place in *El Morro* i.e., works taking place within forest reserves, indiscriminate tree felling at the top, potential impacts over a boulder and a secondary forest with notable trees hence increasing risk of flooding, among others.

In a 27-minutes film documentary produced by students from the *Universidad Autónoma de Occidente,* a local leader denounced "Constructors violently fell around 2.000 trees crucial for hydrological control of the Meléndez River (…) these trees were home for

species such as the *guatín*, *guacharaca* (…) in an area used by us for enjoyment, sports and to fly kites. And the runoff waters which contributed to the sonority of the Meléndez River were abruptly buried, decreasing the river flow." (Florián, 2012). The Head of the Environmental Territorial Commission, CAT of *comuna* 18 as of 2010 (interviewee 3), informed about the existence of roughly 40 water springs and three wetlands along the medium-low basin of the river and indeed, one of the main obstacles *Altos de Santa Elena* (stage 1) is still facing are mitigation works to control water sprouts, which even come out from the floor of the apartments (interviewee 8).

Ironically, the *Megaproyectos* were meant to host families previously living in high-risk areas of the city, but precisely the hills in dispute "require special management measures to ensure the stability of the slopes." (DAGMA, 2009). Moreover, the vulnerability analysis contained in the POT identifies the west limit of *comuna* 18 among the areas with "very high vulnerability" in Cali (DAMP, 2014, p. 125).

As in the case of the Popular Action, this mobilization also revealed divergent visions towards the river. On one hand, new incoming residents of *Altos de Santa Elena* (stage 1) see it as an opportunity to venture to a new life in a historical site of Cali—although they have openly manifested in press their disappointment as the project hasn't delivered what was promised. On the other, residents who settled in along the river back in 1970s, claim the "right of equality" since they argue this project is meeting the needs of 'outsider' communities before fulfilling historical debts the City Administration has with founders of *comuna* 18 (interviewee 1; Florián, 2012).

Social pressure from leaders pushed the DAGMA to conduct site visits and issue a series of technical concepts to developers, both public and private, explaining why the current terms of reference of the *Megaproyectos* were ecologically unfeasible. Simultaneously, leaders addressed follow-up letters to the City Administration reinforcing the need of protection of several components in the landscape: a relic of Tropical Dry Forest (TDF) of approximately 9ha with trees reaching heights of 20 mts, one wetland, three wet zones, a 37m2 artificial lake with fishes and fed by hand-made drainages, two important species of birds: *Picumnus granadensis* (endemic of Colombia) and *Ortalis motmot* (in the way of extinction in the Valle del Cauca region), among others.

Leaders also emphasized this was a public good, as both hills were part of the "Zone for Public Use in the *Rivere* of the Meléndez River, in order to conform a recreative park" (Agreement 059, 1968). This is how objection letters linked local knowledge to technical information provided by the DAGMA and *Corporación Biodiversa*. In the midst of these communications, two plights were taking place: the argument whether the urban or rural environmental authority of Cali should tackle the violation of environmental norms in *El*

Morro and life threats against *comuna* 18's environmental leaders who opposed to *Santa Elena* project. The latter was openly informed in one of the sessions of the National Senate in Bogotá in 2011 (Canal Congreso , 2011).

Social leaders decided to channel their protective efforts and requested the DAGMA to incorporate *El Morro* in the System of Local Protected Areas of Cali (SIMAP) as a site of 'Landscape value' (see table 9). This petition was based on the ecological, social, cultural and historic-archeological values that locals attached to *El Morro*. Indeed, as further explained, *El Morro* was the most significant contribution the community did to the RMUS process with *Corporación Biodiversa* in 2013. The community identified *El Morro* as the main entertainment site. *El Morro* hosted a human-made lake fed by runoff waters, three wetlands, an open field to fly kites and play 'golfito' or mini golf and endemic species. As a significant fraction of *Club Campestre*'s labor force has historically came from *comuna* 18, caddies (or golf assistants) brought home old equipment inherited from associates and established their own golf course. Locals would play golf in their own golf course, right next to the prestigious and private *Club Campestre.*

Figure 11. Golf course (*golfito)* and artificial lake in *El Morro* (2005).

Relicts of Tropical Dry Forest embrace the area.
Photos hosted by Universidad ICESI's digital library **(2014)**.

"Para ellos El Morro iba sí o sí, era como su ícono cultural. La comunidad pidió que fuera incluido como uno de los objetos de conservación de la RMUS. Ahí ellos tenían golf para los caddies o para la gente que estaba empezando a jugar ¡Y gratis! También lo usaban para hacer picnics, caminatas y como un mirador para ver el atardecer (…) Otro asunto álgido para ellos eran los cuerpos de agua. Yo recuerdo que el botánico de nuestro equipo técnico identificó matas de humedal. Era un

humedal en El Morro, justo al lado del río. El botánico identificó juncos pero las licencias ya estaban otorgadas. Nosotros notamos unas zanjas en el piso para drenar y pensamos que eran hechos por la comunidad para el golfito pero no, aparentemente los constructores estaban haciendo eso para secar el humedal.". Entrevistado 8.

[translation] "For them [community members] *El Morro* was out of question; it was like their cultural icon. They required *El Morro* to be identified as one of the four RMUS' conservation objects. There they offered golf to caddies and in general to everyone who was getting into the sport. And it was for free! They also used the site for picnics, walks, and to enjoy skyline views for sunset (…) Water bodies were also an issue for them. I remember the botanist of our technical group identified wetland vegetation, in a wetland in *El Morro,* right next to the river. He identified reeds but [construction] licenses were already issued. We noticed a few ditches and thought they were made by the community to favor the *golfito* but no, apparently developers were doing this to dry the wetland.". Interviewee 8.

"Con un colega pensamos en una estrategia para hacer visible la importancia de 'El Morro'. Entonces promovimos un festival de cometas con un enfoque ecológico, y lo seguimos haciendo cada año desde el 2013. Esa estrategia es una forma de mostrar que seguimos luchando por el lugar, a pesar de que no quedó incluido en el POT como un objeto de conservación a causa de un antecedente normativo.". Entrevistado 3.

[translation] "Along with a colleague we thought about a strategy to make visible the importance of *El Morro*. So, we promoted a kit festival with an ecological focus, and we have kept doing it every year since 2013. It is a way to show that we stand in the defense of this place, regardless it was left out of the POT as a conservation object due to a previous norm.". Interviewee 3.

Figure 12. The ecological and environmental kite festival was 'institutionalized' by local leaders as a way of resistance against housing projects in *El Morro* (2015)

Courtesy of N. Estrada, Head of the Environmental Territorial Commission, CAT of *comuna* 18 as of 2010.

Table 5. Artifacts, social arenas and actors linking both (case study 1, mobilization 2)

Created artifacts	Objection letters addressed to authorities Banners, posters
Other artifacts	Documents supporting exploitation plans National acts Ecological and environmental studies about the site
Actors	Activists Journalists Lawyers the community has the right to address Environmental committees, Local Action Boards, and other institutions at the neighborhood scale
Social arenas	Judicial arena Public Hearing (*Audiencia Publica*) Media (interviews, TV news report, one documentary) Protests Traffic blocking Damage to property Artistic representations (kite festival)

c. **The Municipal Reserve for the Sustainable Use of the Meléndez River—RMUS (2013-214).** In 2012, the DAGMA and The Nature Conservancy, TNC developed a methodological guide to identify a system of protected areas for Cali, known as SIMAP (*Sistema municipal de áreas protegidas*). The SIMAP seeks to integrate ecosystems that have traditionally been seen independently, for instance river basins and eco-parks. At the same time, the Head of DAGMA's Ecosystems Division said the purpose of this exercise was to frame different natural areas under a common strategy, one that beyond biodiversity technicalities, engages popular participation and inter-institutional

coordination (interviewee 9). The final assessment identified 23 areas in need of protection as they were "representative sample of the latest coverage of piedmont ecosystems of Cali and preserving them should promote alternative strategies of housing, energy, mobility, production and human and institutional relationships that allow us to improve the sustainability of the municipality." (DAGMA, The Nature Conservancy, & Corporación Biodiversa, 2012, p. 84). The RMUS was not only one of the candidate areas, but a priority for 2013 in terms of ecosystem representativeness, vegetation coverage, climate threads and social mobilization.

In 2013, the SIMAP identified four areas in need of protection but financial resources were scarce to meet all protection needs. Funders then visited all areas and realized the Meléndez River was a highly contested site and community members were engaged with the idea of restoring and protecting the river.

> *"Era claro que la gente se estaba movilizando hace rato. Había muchas solicitudes comunitarias que ponían en complejidad al municipio y mucho era en temas ambientales. Las solicitudes exigían, por ejemplo, el seguimiento al fallo de 2011. También denunciaban ocupación de franjas protectoras del río o vertimientos de aguas residuales. También se manifestaban por el Macroproyecto de Santa Elena y los nacimientos de agua comprometidos ahí. Es una zona muy compleja (…) Más allá de los aspectos técnicos, el Meléndez también fue incluido porque la comunidad supo vender el proceso… porque cuando Conserva Colombia priorizó los proyectos, hicieron visitas de campo y se aseguraron de que la comunidad estuviera presente. Y ellos vendieron muy bien el proyecto; hablaron de especies endémicas... la gucharaca, el guatín, y ecosistemas que querían proteger.". Entrevistado 22.*
>
> [translation] "It was clear that people were mobilizing a while ago. There were many community requests that put the municipality under the spotlight and a lot dealt with environmental issues. There were many letters, for example, claiming follow-up to 2011's verdict, also informing us about occupation of the river's protective strips and wastewater discharges. They also addressed the Santa Elena *Macroproject*o and the water bodies compromised by this intervention. It is a very complex area (…) Beyond technical aspects, the Meléndez was also included because the community knew how to pitch the process... because once *Conserva Colombia* [TNC & Fondo Acción] prioritized projects, they conducted field visits to those sites and made sure the community would be there. And they [community members] pitched the project very well; they talked about endemic species… the 'guacharaca', the 'guatín´, and ecosystems in need of protection.". Interviewee 22.

A report of 2012 issued by the General Comptroller of Cali reaffirmed these findings: "Since 2010, the DAGMA has carried out actions for the protection of the Meléndez River basin in response to the different complaints and requests from the community". (2012, p. 18).

This is how the Meléndez River became SIMAP's pilot exercise. The City Administration and TNC's program *Fondo Acción* financially supported it and placed equal attention to conservation needs as to social mobilizations. The aim of this project was to acknowledge environmental, cultural and historical values the community held for the area and jointly identify 'sites' and conservation 'objects'. This process was led by the DAGMA, two nonprofit organizations—*Fundación Danza y Vida* and *Corporación Biodiversa*—and *comuna* 18 dwellers. Later on, people of *corregimiento La Buitrera* (rural area) were also on board as their 'urban' neighbors stated it was crucial to incorporate the upper basin of the river into the process. Based on their leadership and rich knowledge, the community appointed 15 local leaders to work on different committees, leading thus to a knowledge co-production process between *Corporación Biodiversa* and the locals. In this sense, *Corporación Biodiversa* linked the institutions to the community and offered a mechanism to catapult this place-based struggle with scientific language and reports. This is why *Corporación Biodiversa* was previously referred as a scale-crossing broker linking different actor groups (Ernstson, Barthel, Andersson, & Borgström, 2010).

Between 2013 and 2014, the DAGMA, TNC's *Fondo Acción*, *Fundación Danza y Vida* and *Corporación Biodiversa* embarked on a process to designate Cali´s first urban protected area. Based on TNC's methodology for conservation areas planning (Granizo, et al., 2006), the community and *Corporación Biodiversa* jointly undertook inventories of fauna and flora and identified local preferences and needs in regard to public space. The targeted area encompassed a polygon of 700ha (DAGMA, The Nature Conservancy, Fundación Danza y Vida, & Corporación Biodiversa, 2014, pp. 19, 343) and after months of fieldwork, four conservation objects were identified: i) hydrological network, ii) lattice of vegetation coverage, iii) *Ortalis columbiana* or *guacharaca*, and iv) *El Morro* (or 'The Hill"). This exercise gave way to define the RMUS Environmental Management Plan, a technical tool that motivated local leaders to create *Aprometéndez,* a non-profit organization (interviewees 1-4). *Aprometéndez* was born as a pledge to channel civil-led activities to restore the river as well as a platform upon which local knowledge of the Meléndez could be incorporated into different city plans.

The term 'urban protected area' would have disclosed old regulations related to the Meléndez River. Under this term, people living along the protective strips of the river and in high-risk areas would have been immediately resettled, meaning not all members of

the community would've supported the RMUS as their home and livelihood were at stake. However, during the first meeting with community members, *Biodiversa* explained protected areas hold different zoning including areas for sustainable development. Therefore, the category 'reserve of sustainable use' seemed suitable and posed hope to those who pictured themselves part of the new era of the Meléndez River i.e., taking part in processes of productive systems conversion or eco-tourism and environmental education projects. In fact, during a participatory observation carried out on the field, there wasn't an explicit mention to human informal settlements but rather a positive message about how people could remain on the site and make significant contributions.

> *"Está bastante impactada la reserva, por eso hemos identificado las potencialidades. No solo concentrarnos en los impactos sino en las potencialidades. Hay personas que están en la reserva pero que son muy valiosas. Y nosotros podemos ser parte de la solución. Una de las actividades que hay son las mujeres artesanas. También promovemos recorridos pedagógicos con colegios (…) promovemos avistamiento de aves, identificando especies dispersoras de semillas como la guacharaca que obviamente nos van ayudar al proceso de restauración (…) También hacemos talleres sobre reciclaje y reutilización para disminuir los residuos hacia el río y nos hemos asociado con colegios para desarrollar actividades de educación ambiental, por ejemplo, niños en La Buitrera que les gusta identificar y conocer los insectos, las semillas y otras actividades.". Observación participativa 1.*
>
> "The area [RMUS] is quite impacted, that's why we have identified potentialities. Not just to focus on the impacts but the potentialities. There are people in the reserve, but they are very valuable. And we can be part of the solution. One of the activities we have is the craftswomen group. We also promote pedagogical tours with schools (...) we promote bird watching, identifying species for seed dispersal such as the 'guacharaca', this will indeed help us with the restoration process (...) We also do workshops about recycling and reuse to reduce waste disposal to the river and we have teamed up with schools to develop environmental education activities, for example, children in La Buitrera who enjoy getting to know and identifying insects, seeds and so on." Participatory observation 1.

As already mentioned in numeral a), the designation of this site as a Reserve of Sustainable Use provoked frictions among leaders. Those holding a preservationist view felt this designation was only "scratching the surface" of the problem and it would clear the ground for development plans.

With great compromise, in 2014 *Aprometéndez* leaders organized a 5.000-people artistic parade inviting *caleños* to remember and celebrate the environmental values of the river. This initiative was known as the Carnival for Life (*Carnaval por la vida*) and until now, it has been the largest environmental mobilization in the city. Leaders created a crowdfunding system based on bonus of different prices and campaigned across the city for financial support (this helped covered banners, caravans, transportation, sound system, snacks and water). *Aprometéndez* mobilized local and national organizations, from schools, students' collectives, teachers, social leaders and artists to national NGOs and press. The *Nasa*, *Yanaconas* and *Misak* indigenous peoples also joined the Carnival. *Aprometéndez* leaders convinced the City Administration that army forces were not needed since this was a peaceful manifestation, under the wing of the *Nasa* Indigenous Guard (interviewee 2). The Guardians of the Mother Earth inaugurated the Carnival with a traditional ceremony and representatives of the Network of Eco-Villages of Colombia (*Red de Ecoaldeas*) also "blessed" this Carnival upon its inauguration (Pazífico Noticias , 2014). People was invited to take part and perform artistic caravans evoking the Meléndez River and its nature. The closure of this mobilization was a symbolic demonstration in the Administrative District of Cali, where leaders handed a proposal to include the RMUS into the Land Use Plan, POT to a representative of the Mayor of Cali.

Figure 13. Carnival for Life (or *Carnaval por la vida*). June 24, 2014

Top: News archive from *Diario de Occidente* and *El Tiempo*. Bottom: Artistic demonstrations evoking the RMUS' conservation objects e.g. *El Morro* ("The "Hill") and the *guacharaca* (*Ortalis columbiana).* Courtesy of A. Cáceres, *Corporación Biodiversa.*

Unfortunately, the Carnival for Life brought with it a bittersweet taste. Due to internal frictions, the carnival marked the rupture of *Aprometéndez*, as core leaders split and

formed a second non-profit organization called *Aprocuencas*. This, again, added up to the existing divergent visions towards river and its management.

> *"Tristemente acá predominaron las ambiciones personales, el deseo de protagonismo, el deseo de ciertas personas de que las tengan en cuenta para ganarse un proyectico, para conseguirle trabajo a sus vecinos, sus parientes. Esos integrantes de Aprometéndez pensaron más en lo chiquito que en lo grande. Ellos no vieron Aprometéndez como la organización bandera de 'vamos a seguir luchando por el río' sino la ambición les hizo creer que con la sola corporación iban a llegar todos los proyectos del plan de manejo de la RMUS (…) Otros líderes pueden tener conexiones con políticos, y esto puede favorecer su posición en la reserva ya que los predios en los que viven no están legalizados (…) El manejo de las cuentas del carnaval fue complicado, no se entregaron todos los recibos porque cada boleta estaba numerada pero la contabilidad final no reflejó eso. Por eso algunos de nosotros [líderes de la comuna 18] eventualmente fundamos una nueva organización pero ese no era el objetivo original."* Entrevistado 4.
>
> [translation] "Sadly, personal ambitions predominated here, the desire for prominence, the desire of these people of being considered so that they can get new projects, or jobs for their neighbors or relatives. Those members of *Aprometéndez* didn't see the big picture. They didn't see *Aprometéndez* as the flagship organization of 'let's continue fighting for the river' but the ambition made them believe that with the solely creation of the corporation all the projects of the RMUS' management plan would be guaranteed (...) Other leaders could have connections with politicians, and this may favor their position in the reserve because the plots they live in are not legalized (...) And the handling of the carnival accounts was complicated, not all receipts were submitted because each ballot was numbered but the final accounting did not reflect that. That is why some of us [*comuna* 18 leaders] eventually founded a new organization but this was not the original plan.". Interviewee 4.

In sum, the incorporation of the RMUS into the POT was the result of a series of fortunate events. First, a social mobilization was on the rise since 2006; second, in 2011 the Administrative Circuit of Cali ruled in favor of 2006's Popular Action; third, in 2012 the DAGMA published the methodological guide to implement the system of local protected areas of Cali; fourth, the elaboration of the new POT and the Carnival for Life concurred; and finally, the RMUS' plan was completed in 2014, addressing ecological and cultural values of the Meléndez River.

Table 6. Artifacts, social arenas and actors linking both (study case 1, mobilization 3)

Created artifacts	Scientific reports Hierarchic lists of species and services Maps of the types of ecosystem, vegetation coverage and water bodies found in the targeted polygon. Outreach material about the RMUS for the general public Banners, posters, flyers.
Actors	Scientists (from two NGOs) Local leaders Representatives of private areas within RMUS (Country Club, military base). City Administration (DAGMA)
Social arenas	Media coverage Workshops Public debates (e.g. City Council) Artistic demonstrations (Carnival for Life) Invitation to sign a petition (www.change.org to protect *El Morro*)

3.2.3. *El Morro* take it or leave it!

The downside of the RMUS designation was *El Morro*. Right before signing the Legal Act supporting the POT, a last-minute negotiation left the community with tied hands: either to leave *El Morro* out of the final polygon and include the rest of the exercise into the POT or forget about the entire RMUS process. As already explained in numeral b), cultural, environmental, ecological and even anthropological arguments seemed insufficient to defeat this political battle. The decision was therefore to take *El Morro* out the RMUS' final polygon and keep fighting for it in different social arenas—an impetus that is still standing today. *El Morro* has been, literally, an uphill battle.

> *Lógicamente eso fue un golpe porque todos los argumentos no fueron suficientes. Pensamos que con el soporte biológico, técnico, científico era suficiente para declararlo [El Morro] pero ya un tema legal se vio superado, un antecedente lamentable pues ya había una licencia previa para urbanizar. Y eso es de orden nacional y supera el POT, está por encima. Y tuvimos que escoger: o se caía todo o cedíamos en ese momento y luego veíamos la manera de seguir movilizándonos. Y entonces se aceptó de esa manera. Pero hemos seguido. Hemos escrito al Ministerio de Ambiente adjuntando los soportes de Biodiversa, incluso se fue hasta la Vicepresidencia de la República. También hay una petición en Change [www.change.org] para proteger esa área. Se hicieron reuniones con la directora del DAGMA y eso llevó a una reunión entre el DAGMA y la Secretaría de Vivienda. Pero ha llegado a un punto muerto porque Vivienda tiene una posición y el DAGMA tiene la contraria (…) hasta el momento hemos logrado que Cusezar ceda un área de parqueaderos y una de las diez torres del proyecto Mirador Campestre para que ahí*

se recupere uno de los humedales, que va a ser llamado humedal Santa Elena (…) pero seguimos presionando.". Entrevistado 3.

[translation] Logically, it was quite a shock, because all arguments were not enough. We thought *El Morro* could easily be designated because we had biological, technical and scientific reports but a legal issue overcame our claim. An unfortunate event since there was already a previous license to urbanize this area. And this is a national project, so it exceeds the POT, it's above. So, we had to choose either to let the whole exercise fall apart or to give in at that moment and then find ways to keep mobilizing. We chose the latter. We have continued. We have addressed the Ministry of Environment and along those communications we have attached the *Biodiversa* reports. This claim even passed on to the Vice Presidency of Colombia. There is also a petition in Change [www.change.org] to protect this area. We held meetings with the director of the DAGMA and that led to a meeting between the DAGMA and the Housing Department of Cali. But the issue has come to dead-end because the Housing Department and the DAGMA hold different positions (...) so far we have managed Cusezar to give in a parking area and one of the ten towers of the *Mirador Campestre* urbanization so that one of the wetlands can be restored, it will be called as the Santa Elena Wetland (...) But we are still pushing this through.". Interviewee 3.

Despite fatigue and internal ruptures, community leaders keep pushing institutions from different fronts. For instance, the Environmental Territorial Commission, CAT of *comuna* 18 remains active. In 2014, they addressed the Presidency Office, since *Altos de Santa Elena* is part of the national initiative *Macroproyectos de Vivienda*. However, the National Government bounced back the decision to the Mayor of Cali, Mr. Rodrigo Guerrero, who said *El Morro* was the proper spot for *Altos de Santa Elena* and anyway, there were no additional terrains 'available' for urban expansion in the city (interviewee 4).

In 2015, letters were addressed to DAGMA to follow-up on the restoration of one of the wetlands compromised by works done by Cusezar developers. In 2016, the CAT requested the DAGMA to make a purchase offer to constructors owning two plots located inside the RMUS: "both plots are in need of protection and are vital to keep the ecological functioning of this area for water harvesting and regulation (…) also, by keeping this site as an ecological corridor, it will be possible to preserve ecosystems threaten by urban expansion as well as all four conservation objects identified in the RMUS. The first plot [APROVIVA] could potentially host a center for environmental education." (CAT comuna 18, 2016). According to the DAGMA, in this case, owners must voluntarily offer the plots to the municipality. The CAT therefore issued a letter to Marval developers requesting to

give up or transfer to the municipality of Cali an area of approximately 0.6ha from *Ciudadela Campestre* urbanization in order to enable ecological restoration of *El Morro*'s western side (CAT comuna 18, 2018). And in the end, leaders are trying to assemble the pieces all three housing projects have left on their way.

3.3. El Cortijo Wetland

3.3.1. From a private wetland to a city buzz

Before May 2017 El Cortijo Wetland was not popular in the city nor it was among the residents nearby it. Actually, the wetland is located in a private plot right next to the Lili River which denotes the start of Cali's urban expansion area. This struggle emerged right at the border of *comuna* 17, a high-income area. As Metrocali started works in this area, the holder (interviewee 14) confronted the machinery installed arguing no previous notification or agreement was settled between him and the Administration. Meanwhile, the containers were moved to an open area of *comuna* 17, outside the plot, in front of a few resident units of the Valle del Lili neighborhood, right in the open area locals used for jogging, walk the dogs, and kids train football.

Back then, the *comuna* 17 was not a local user of the wetland. What triggered their reaction was rather the occupation of their green area. However, as leaders dived into the project[9], they realized it compromised four key environmental aspects: Lili River's protective strips, its hydrological network (one lentic-type wetland, four springs, one stream), a remnant of Tropical Dry Forest and overall, its biodiversity. They knew this was a key area for flood control, as well as an ecological corridor between the Lili River and the Ecological Belt limiting *comuna* 17 to the east—both included in the Ecological Main Structure (EMS) of Cali. Leaders brought the pieces together, and this is how the El Cortijo Wetland protective narrative came into shape. After a few months of struggle, advocates made clear they were not against development projects *per se*, but rather against exploitation of a piece of nature that was essential for a wider system.

[9] The whole project encompasses six structures: South Transport Terminal of Cali, an inter-municipal terminal, an administrative center, two malls and a *patio taller.*

Figure 14. Targeted area for the South Transport Terminal.

El Cortijo is a "hum" lying on the right margin of the Lili River, unfortunately separated in 2011 when a dike was erratically built. Photo posted in the Facebook group *Humedal El Cortijo Cali*, with edits by the author.

Within a week, the Administration introduced the South Terminal Transport's plan to *Valle del Lili* dwellers. Right before Metrocali's staff started the session, the JAC President of *comuna* 17 (interviewee 15), stated they would not accept such meeting because the project representatives were hesitant to share the documents with the community. Echoing this posture, most of residents left the room arguing they had the right to be informed and get prepared beforehand.

The first mobilization started right on the next day as a core group of residents briskly split tasks and obtained the project reports. They created a WhatsApp group and started to meet on daily bases, after work, to discuss the contents. Environmental considerations were revised by a Professor of Environmental Impact Assessments (interviewee 13) and a Senior Advisor of the Environmental Authority of Valle del Cauca, CVC; legal aspects relied on a Lawyer (interviewee 16); impacts to human health were addressed by a Medical Doctor; an Architect took care of all urban planning aspects and a Trader supported all aspects to certain extend (interviewee 12). The strategy was clear: to analyze and synthesize contents to then inform residents in the units nearby. Three members of this group visited each resident unit and explained the scope of the mega-construction to the neighbors. The core meetings went on for four months as new documents and information came into the discussion.

Meanwhile, the JAC President started to contact local press and political leaders from further local organizations—her homologs. The aim was to agitate the debate and warn the city about this project and the works the Administration was already undertaking on site, for instance, traps compromising the fauna and ditches to 'channel' running waters feeding the wetland. This was followed by TV and radio interviews led by the core group.

The next strategy was to block traffic, holding signs and banners to warn residents of the Valle del Lili who were not reached out to during the informative meetings. The core group also monitored Metrocali's activities and showed up in every meeting they came to know the project was being introduced. They would show up with banners and flyers, and actively participated in the discussion with arguments and facts extracted from technical documents.

Figure 15. Different mobilizations

Source: Facebook group *Humedal El Cortijo Cali* (2017).

A Facebook page was opened to increase the visibility on this matter. Here activists reported activities such as tree felling, and posted videos made with drones so that followers could better dimension the area to be impacted. Information about protests, traffic blocking and open debates with Metrocali and the City Administration were also posted in this page.

A key strategy was the Resistance Tent (*Carpa de la resistencia*), strategically located right next to the containers and meant to be a hub for information, education and monitoring towards the wetland. Between May and September 2017, someone from the community would always be there, even for night guard in the tensest moments of the mobilization. This is the most symbolic artifact of the mobilization and it's still active today.

Figure 16. The Resistance Tent (or *carpa de la resistencia)*

Photo by M. Mejía (2018).

At this point, July 2017, leaders realized the need to hire top-level lawyers to escalate this claim against the City Administration (Metrocali and environmental authorities). First, they backed up these contracts with their own resources in order to keep up the pace of the process, and, simultaneously, they organized *kermes* as a crowdfunding strategy. The community responded quite well. The first *kermes* collected roughly 4.000 USD, 16 times the minimum wage in Colombia. These resources were commissioned to the first lawyer the community hired. Up to date the process counts on four lawyers.

The struggle was efficiently amplified to the city, meaning the message was publicized relatively fast. Different actor groups helped to boost the process. Since this area is known as Cali's university cluster, El Cortijo activists started to promote site visits to the wetland, mainly targeting students. Some professors even chose this as a case study site in their class *repetoir* (for instance the Ecological Economics Research Group from *Universidad del Valle*). Interviewee 15 said sometimes they had to offer two site visits per day because over 100 visitors will show up in a single day, "And people waited!". Leaders also joined forces with other environmental activist of the city e.g., the Zanjón del Burro struggle placed in a very-high income area (*comuna* 22), Laguna el Pondaje y Charco Azul (*comuna* 13) and politicians defending human rights and animal rights.

By the end of 2017, new inventories of fauna and flora were consolidated thanks to the involvement of biology-trained activists (this is the case of interviewee 17). New data helped to geared up presentations to third parties (press, visitors, politicians and technical advisors from different institutions). These statements increased social

awareness towards the wetland city-wide: people living in the Valle del Lili neighborhood were captivated by the fact that wildlife was also part of the neighborhood.

3.3.2. Evidence and counter-evidence: the tug-of-war

"If everything is legit why are works still blocked?" (interviewee 14). As activists started to dive into this case, they found several irregularities not only in the way the plot was pursued by the City of Cali, but the mechanism underlying environmental permits granted back in 2011 when plans for this mega-construction began. Permits dealt with forest exploitation, occupation of the Lili River's channel and opening of roads and exploration. In sake of this research, however, here I focus on the values local leaders attributed to the wetland and how they mobilized this narrative through social arenas, rather than disentangle the legitimacy (or not) of the process since 2011.

Decisive moves from national authorities helped to build momentum for El Cortijo Wetland's protection. These actions blocked construction works in different moments of time and are the result of juridical processes run by better-resourced group of activists. In the course of 11 months, the lawyers hired by the community filed three legal claims that were based on scientific reports and national acts. The main arguments can be narrowed down as follows: ecological relevance of Tropical Dry Forests (TDF) nationally and globally; environmental history of Cali highlighting that only 3.4% of the wetlands reported in 1957 persisted in Cali (DAPM, 2014, p. 51); human health issues as the wetland mitigates pollution of underground water due to lixiviates from former landfill *Basuro Navarro*; and further ecosystem services offered by urban wetlands based on the RAMSAR Convention.

Although lawyers and activists appealed to several national acts referring to collective rights, two were key to actually hinder construction works. The first was the National Law 1185 of 2008 which details what the Nation understands by cultural heritage. The lawyers claimed the South Transport Terminal overrun the right to heritage as the site was a burial place for black communities in colonial times and also served as a resting point for the *Lilíes* indigenous people in pre-Hispanic times. Secondly, it was the National Resolution 213 of 1977 which established a ban for some species and products of the wild flora in Colombia and posits that felling of vegetation species of national interest requires special protocol (bromeliads, orchids, mosses, liverworts and lichens). Legal claims alluding to both arguments were gamechangers in August 2017 and May 2018, respectively.

Additionally, in June 2018 the Public Minister ordered the suspension of forestry activities in the area and commissioned the Universidad del Valle to issue a concept about

the South Transport Terminal. After considerable delays and impediments, the study was finally completed in May 2019. Despite negative impacts on the forest and hydrological system on site being widely reported within the document, conclusions are far from being forthright. The study recommends expanding restoration measures and including El Cortijo Wetland in the official wetlands' inventory. It also calls on authorities to monitor land-use changes and transport of materials to the site and suggests further studies should be undertaken, for instance, an Environmental Impact Assessment (EIA) as such.

Local powers have responded with palliative measures, think activists, and some objection letters mention negligence from regulatory agencies. The City Administration seems confronted between engaging with an idea of sound ecological connectivity and solving mobility pressing issues in the city. As explained in section 1.2. Empirical context, municipalities in Colombia are comprised of different technical bodies i.e., urban planning, transport, infrastructure and housing, rural lands and environment (here the CVC), risk management, etc. These offices do play a role in the implementation of the Ecological Main Structure (EMS), but none focus exclusively on it (Andrade G. I., 2009). Furthermore, the performance of environmental authorities acting in the urban and rural areas diverge in terms of resources, capacities and priorities. As in the case study of the Meléndez River, this case portrays differences not only between technical bodies within the City Administration (environment vs transport) but across scales of governance (rural vs urban; national vs local).

The center of the confrontation between activists and Metrocali is what both actor groups understand by 'progress'. Here, some argue that transport facilities in this particular site is pivotal for Cali's progress (good-quality and accessible mobility), whereas others claim that progress is underpinned by the right to a healthy environment. On one hand, Metrocali claims there isn't any technical reason why the South Transport Terminal shouldn't be built on this site—land use was approved since 2000 and rectified in 2007, licenses and permits were issued from the rural environmental authority (CVC) and technical studies are completed in accordance to the POT guidelines (interviewee 18). The Terminal is expected to connect the north of the city with 600.000 people estimated to live in the south, reduce travelling time by 17%, and benefit 6.000 passengers per day and overall, 50.000 university students who commute to/from *comuna* 17 every day (Metrocali, 2017, p. 47).

On the other hand, activists of *comuna* 17 claim they are not against expanding Cali's Massive Transport System, but rather they aim to make visible the importance of the TDF as a globally threated ecosystem and the wetland as a piece of a wider hydrological system. Activists reinforce these arguments appealing to the fauna linked to the wetland e.g., 109 species of resident birds and other migratory birds coming from Canada and the

United States of America, then heading to Chile and Argentina. Benefits people obtain from this natural area are also recurrent arguments: air purification, microclimate regulation, flood prevention, entertainment, leisure and sense of place. In addition to environmental considerations, leaders have also questioned the technical aspects of the project, claiming that the South Terminal should be actually located further south, converging with highways such as *Cali-Puerto Tejada*. To this, Metrocali added,

> *"En su momento quizá la tendremos que hace más al sur. Yo creo que la visión del sistema va a ser conectarnos con Jamundí, que en algún momento se convertirá en un área metropolitana o algo por el estilo. Pero hoy no podemos hacer eso. Si lo hacemos hoy estaríamos generando viajes negativos y viajes en vacío (…) eso quiere decir que un usuario que va al norte tenga que abordar el sistema que lo lleve a hasta al sur y luego lo devuelva, por eso es negativo. Y los viajes en vacío es el recorrido que hace un bus antes de iniciar su operación comercial, antes de que se suban los pasajeros. Eso quiere decir que yo tendría gastos en gasolina, emisiones, congestión adicional en las vías sin que ese bus esté moviendo un solo pasajero.". Entrevistado 18.*
>
> "Probably, at some point we will have to build the Terminal further south. And I think the vision of the system is to connect the city to Jamundí, which will eventually become a metropolitan area or something like this. But today we can't do it. If we do this today, we will be incurring in negative and void-type journeys (…) this is, that a passenger heading north will enter the system and be dragged all the way to the south to then be taken back north. That's a negative journey. A void-type journey is the route a bus does before starting its commercial operation, before passengers get on board. That means that I would have expenses on gasoline, emissions, additional congestion on the roads without that bus being moving a single passenger.". Interviewee 18.

Great attention has also been placed on the argument of the economic benefits derived from the Terminal. In a meeting with Metrocali and the CVC in July 2017, interviewee 13 explained no contingent valuation[10] was found in documents provided by Metrocali to support the idea that lands surrounding the Terminal will be appraised.

> *"Ustedes dicen que se valorizan todos los predios. Bueno, a mí en Economía me enseñaron que el precio de algo se explica por las preferencias que tiene la gente para adquirir un bien ¿cierto? Si usted hace un estudio de valoración contingente en esa zona y le pregunta a la gente (…) ya hemos estado haciendo ese ejercicio nosotros*

[10] A technique that reveals peoples' preferences.

mismos, preguntándole a la gente '¿usted por qué compró en esta zona?'. Le voy a decir las dos características de esa preferencia para que se informe: calidad ambiental y tranquilidad. Las dos preferencias van a desaparecer. Ustedes nos muestran un esquema sin ningún dato, eso no es ninguna prueba científica, ninguna evidencia. Una prueba científica debe estar sustentada en un método.". Intervención del entrevistado 13 en una reunión con Metrocali en 2017.

[translation] "You say that all properties will be appraised. Very well, in Economics I learned that prices are explained by the preferences that people have for acquiring a good, right? If you conduct a contingent valuation in that area and you ask people (...) we have already been doing that exercise ourselves, asking people 'why did you buy in this area?' Let me tell you the two characteristics of that preference so that you can now know: environmental quality and tranquility. And those two preferences will disappear. You show us a scheme without any data, that isn´t scientific evidence. A scientific study must rely on a method.". Interviewee 13 in a meeting with Metrocali in 2017 (Micolta, 2017).

Activists living in the units facing the Lili River (*TerraBella* or *Verde Real*) stated they were told this urbanization was meant to be an eco-village, and that the absence of green areas within the compounds was supposed to be compensated with trees, parks and green corridors in the neighborhood (interviewee 16). Evidently, the mega-construction of the South Transport Terminal in front of their units frustrates such idea as well as the location as a place of tranquility. In contrast to the eco-village promise, four years ago, residents from *Ciudad Bochalema*—further south—were assured Metrocali would provide mobility solutions since the neighborhood has only one access/exit road. Based on media reports, people living in this neighborhood support the construction of the Terminal.

Beyond a not-in-my-backyard movement from upper-middle classes, activists in El Cortijo Wetland claim their struggle convenes a conversation about the urban commons, the right of nature to persist in the city and how *caleños* understand 'progress'. Probably, for some, to fight the South Transport Terminal was to place themselves in a wider struggle against erratic planning in the City in the last decades. Examples are tree felling to construct shopping malls (which still haven't reached their full capacity) or cases of corruption.

The community came to the conclusion that this project placed capital-driven interests over the public will and the urban commons (wetlands, rivers, forests). This, activists

argue, because project has been marked by very poor popular consultation and awry legal moves since it all started.

Up to date, the narrative of El Cortijo Wetland has positioned a wetland and forests' remnants as highly valuable urban asset, pieces of nature that were completely unknown before June 2017. The narrative acquired power when activists used reports and national acts and mobilized them through artifacts and social arenas, being juridical processes and press the most relevant, respectively. Some of the artifacts used by activists were developed by Universidad Del Valle[11], the City Administration and Metrocali[12], the CVC, the National Research Institute of Biodiversity "Alexander von Humboldt"[13], conventions such as the CITES or RAMSAR, among others. Activists also appealed to concepts as urban environmental health, resilience and climate change during presentations to Councillors, Procuracy, Legal Capacity (*Personería*) and Comptroller.

Table 7. Artifacts, social arenas and actors linking both (case study 2)

	Description
Created artifacts	Objection letters addressed to authorities Juridical processes together with rightful claimants (Popular Action) Banners, posters, flyers Power point presentations (GIS visualizations, etc.) Short videos for social media, some using drones. Buildings or other physical structures (The Resistance Tent or *Carpa de la Resistencia*)
Other artifacts	Documents supporting exploitation plans National acts Biological, ecological, environmental studies about the site
Actors	Activists Journalists Lawyers commissioned by activists to push through the process Other professionals (Engineers, architects, medical doctors, etc.) University professors
Social arenas	Informative meetings Field trips with students and journalists Press conference/breakfast with journalists Media (newspaper reports, TV and radio interviews, Facebook) Public debates (e.g. City Council, Open Hearing) Judicial arena Symbolic demonstrations (candlethon or *velatón*) Protests Traffic blocking Invitation to sign a petition

[11] Study about the impact of former landfill *Basuro Navarro* (2009) and the technical concept on the South Terminal Transport (2019).
[12] The ecosystem characterization done by *La viabilidad limitada – Ingenieros consultores*, commissioned by Metrocali in 2011 (*Caracterización ecosistémica del área del plan parcial Centro Intermodal de Transporte de pasajeros del sur perteneciente al area de expansión corredor Cali-Jamuní,, municipio de Santiago de Cali*), as well as the biological characterization done by Gustavo Alvares Saa for Metrocali in 2014.
[13] Book *El bosque seco tropical en Colombia* (2014).

Though awareness of this case arose city-wide, based on news archive and objection letters, it was not clear if beyond the wetland itself, the narrative managed to position all four environmental features (river, wetland, remnants of TDF and biodiversity) as one whole, and hence a key node for the ecological network of the city. For instance, wetlands in the rural lands could potentially strengthen this narrative.

Cali holds over 50 wetlands in its urban lands—of which only 7 have Environmental Management Plans in place—and 30 in rural areas. Out of this total, 38 wetlands are located in the south side of the city—where this case study develops (DAPM, 2014; El País, 2017). During the field excursion to *corregimiento* El Hormiguero, a City Advisor for Rural Planning Units, UPR (*Unidades de Planificación Rural*), stated this mobilization could have taken a step ahead by addressing further wetlands in the rural lands, making isolated bodies to find a place in this narrative.

As in the first case study, this struggle experienced internal frictions later translated into group divisions. Despite collective action was built upon a single vision—different from the Meléndez River case—, at some point the will to sustain personal leaderships challenged common agreements such as press protocols or the lawyers to be hired (interviewee 13). Similar to what leader of *comuna* 18 explained about the break-up of *Apromeléndez* in the first study case (interviewee 4), political aspirations of leaders might have also played a role in the splitting of El Cortijo mobilization. Leading roles, management misunderstandings and personal political aims shadowed the initial impulse of the mobilization and its very well-organized collective action. From the original core group of leaders, two activists withdrew in 2018 (Ecological Economist and Architect); two still remain in charge of the analysis and synthesis of new coming information, legal follow-ups and cooperation with academia (Lawyer and Biologist) and two are mostly focused on networking and public relations—whom are currently part of political campaigns in Cali.

4. Discussion

This research posits the ecology of cities as an outcome of protective capacity and management capacity of urban natural areas. Beyond biophysical constrains or natural processes of ecological degradation, social dynamics determine how much and how wide ecosystem services are distributed across the city (Ernstson, 2013). The ecology of cities is ultimately a result of how people create values and narratives; this process bestows certain values upon nature whilst ignoring others. At the heart of these narratives lies power relations, what begs to the question of who can actually take part of value-creating processes. Protective narratives reconstructed in Chapter 3 made evident this power-laden ecology.

One aim of this chapter is to analyze the level of protective capacity and management capacity in both case studies and conjure up the ecological impact of these place-based struggles at the city-level. The other is to explore how the protective narratives crafted by advocates in both case studies created new environmental values that were not spotted by urban planning decisions before (see green rows in table 9). This situation reinforces Cali´s historical pattern of contested geographies, one in which actor groups attach excluding values to the same site—either housing development *versus* forests conservation or a transport terminal *versus* restoring a hydrological network.

Table 8 summarizes the results in correspondence to the theoretical framework of this research. It is important to note that this exercise doesn't pretend to be an assessment but rather to offer a comparable view of the key points of both protective narratives based on results described in Chapter 3. This will be useful, for instance, to reflect how the case with sound protective and management capacity came to fail to position crucial environmental values for locals, or how artifacts mobilized by better-resourced groups had a larger impact in stopping development plans.

Table 8. Summary of results in correspondence to the theoretical framework of this research.

Overarching goal	Analytical modes: Value articulation	Analytical modes: Ecological network perspective	Dimension	Sub-dimensions	Case study 1	Case study 2
To link ecosystem services and environmental justice		✓	Landscape ecology: this approach allows to spatially integrate water, biodiversity, vegetation, people, and man-made structures in urban landscapes.	Connectivity and continuity. Ecosystem approach. Urban-rural interaction. Permeability. Transition.	The site is important to establish an east-to-west connectivity by linking the urban fabric to large protected areas. North-to-south relation is also key by connecting the RSUM with adjacent eco-parks in the urban border. See Fig. 17.	The site is located in area for aquifer discharge. Wetlands and green corridors are therefore key elements to enhance the west-to-east connectivity as they help to control hydrological flows coming from the western chain of the Andes to the Cauca River. See Fig. 18.
	✓	✓	Protective Capacity: level of resistance of a site to disappear as a node in the ecological network.	Civic processes.	Strong yet distant to the gross of the population.	Strong with significance impact in the public opinion city-wide.
				Technical processes.	In favor → firstly, the Methodology for the implementation of the Municipal System of Protected Areas of Cali (SIMAP) and secondly, the RMUS incorporation into the POT 2014.	Not in favor → the South Transport Terminal mega-construction is included in the POT 2014—and the wetland isn't.
				Biophysical constrains.	In favor → slopes and high-risk of landslides.	Not in favor → plains. The site is on urban expansion area. Environmental authorities posit the Terminal will not intervene the river nor the wetland. Finally, according to the City Administration (fig. 2), this site is not located in a flooding risk area.
	✓	✓	Management. Capacity: the ability to carry out management practices that sustain ecological flows through individual green areas in the ecological network.	Practices implemented by civil society groups engaged with local ecosystem management.	In favor → Examples here are the *golfito* and the ecological kite festival.	Unclear ☞ the wetland and TDF are located inside a private plot. Despite El Cortijo activists promoted site visits to the wetland, no practices (possible futures) to foster ecological processes are yet envisioned.
				Practices embedded in institutions and urban planning decisions.	In favor → RMUS' Environmental Management Plan exists on paper, yet its implementation has been challenging.	Not in favor → based on the field work of this research, current practices from different institutions are having a negative impact on the vegetation and hydrological cycle.
	✓		Value articulation (as a social practice)	Artifacts	Many, including the 2011's verdict, a Legal Act of unquestionable hierarchy, and a scientific report.	Not so many → legal claims filed by lawyers hired by the community were the key artifacts.
				Actors related to those artifacts	Local leaders. Scientific and technical organizations. Civil organizations. City offices. Journalists.	Local residents with technical expertise. Lawyers hired by the community. Activists from diverse struggles in Cali. Politicians defending human rights and animal rights. University professors and students. Journalists.
				Social arenas	Many → activists succeed in terms of designation of a protected area, yet they could not stop construction works in *El Morro.* Additionally, divergent visions (and efforts) towards the Meléndez River persist.	Many → Construction works are still blocked, and the gross of the population is aware of this struggle.

4.1. Protective capacity and management capacity

At first sight, the RMUS overcame one of the most challenging barriers protected narratives in Colombian cities hit: the incorporation of areas in need of protection into the POT. The RMUS ended up 2014 with a promising horizon in terms of its protective capacity and management capacity. The former was built upon biophysical constrains (hilly areas), civic processes (mobilizations) and technical processes (incorporation into strategic planning documents).

Secondly, management capacity was equally reassuring since *Corporación Biodiversa* proposed the RMUS' Environmental Management Plan which includes activities of preservation, restoration, eco-tourism, sustainable agriculture, research and environmental education, and control (DAGMA, The Nature Conservancy, Fundación Danza y Vida, & Corporación Biodiversa, 2014, p. 106). Moreover, *Aprometéndez* could have channeled community-led initiatives to restore the river and take part of the bids offered by the City Administration to implement this plan. On paper, management capacity was sound.

This promising atmosphere made advocacy for El *Morro* looked feasible. Activists relied on reports issued by different institutions after conducting technical visits to the site (DAGMA, 2009; Giraldo, Sierra-Paz, & Cáceres, 2013). In terms of management capacity, passive recreational use of the site—*golfito*, ecological kite festival, jogging, trekking, among others—helped to maintain biodiversity and ecosystem services of the site and in broader scales. Yet controversial in biological terms, this particular *golfito* didn't demand irrigation or the use of chemicals and was rather small—comparing to average golf courses of 50 ha. In their publication of 2006, Colding, Lundberg & Folke exhibited evidence on how green-area user groups contribute to urban ecosystem management. The motivation of this study was precisely to demonstrate how small pieces of nature—and the knowledge and stewardship around them—are crucial to sustain ecological flows from/to protected areas. Here, they identified golf courses and the knowledge linked to them, as socio-ecological sites offering an array of cultural services (recreation, social relations, etc.), regulating services (surface water drainage, erosion regulation, etc.) and supporting services (habitat for flora and fauna, seed dispersal, etc.).

Moreover, this narrative was even one step ahead probably without realizing it. The activities undertaken by the community in *El Morro* elevated their protective story into a "projective" story, one in which advocates are able to imagine possible futures in contested areas. As Aalto & Ernstson (2017) phrase it, this means "how novel values and uses are projected onto these spaces, opening them for re-signification and material reworking" (p. 310). Activist of *El Morro* didn't have to project any future, the re-

signification was already taking place (Fig. 11 and 12 prove this). Different futures were being crafted as well. Chapter 3 describes how in 2006, leaders of the Environmental Territorial Commission, CAT proposed to the DAGMA to develop a center for environmental education in one of the private-owned plots in *El Morro*.

Although *El Morro* was geographical- and politically under the wing of 2011's verdict, the RMUS' designation and also backed up by plenty scientific and technical reports, construction works in this area were not relocated. Probably, the narrative could have been fine-tuned to better communicate to the media what was at stake, and how locals were using the site and the reasons why it was in need of protection. This can be understood as the political of problem framing (Layzer, 2012). Neither *El Morro* or the RMUS are in the imaginary of *caleños*, nor is their role as ecological corridors between the urban and rural lands of Cali. As largely depicted in Chapter 3, this case study counted on several actors (including scientific institutions), artifacts and social arenas, making one wonder if lobby and media strategies were thought out by activists—what places the burden on civil action—or if it was a dead-end situation of "the weak" fighting subjects of will and power (Certeau, 1988).

Contrastingly, protective capacity and management capacity in El Cortijo Wetland are not strong as in the first case study. In terms of protective capacity, only civil mobilizations seemed to prevail, since (i) biophysical constrains or (ii) strategic planning documents were not supportive to the narrative. (i) From the official point of view, the site isn't a flood-prone area but rather suitable for urban expansion; and (ii) the construction of the South Transport Terminal is included in the POT of 2014, hence adopted by law. This situation diverges from the first case study since there, slopes represent a physical constrain and the RMUS is included in the POT of 2014.

In regard to management capacity, the horizon is not optimistic. The wetland is inside a private plot now facing serious legal disputes, meaning that up to date, the wetland (and the forest) can be only accessed with prior consent of the current holder. Moreover, due to initial works in the area, current practices are indeed depleting ecological processes—photos taken during the field visit in 2018 evidence mismanagement of runoff waters by Metrocali, dooming the wetland to dry out. Additionally, El Cortijo doesn't have an Environmental Management Plan into place because it was not incorporated into the official wetlands' inventory back in 2011 when it was firstly identified by the CVC. Therefore, the role of communities keen on re-establishing ecological processes *in-situ* is confined, at least, until the City Administration makes a final decision: either to relocate the South Transport Terminal or adjust the current design by fully incorporating the protective strips of the Lili River and El Cortijo Wetland.

However, the spirit of this mobilization in 2017 was to bring urban biodiversity closer to students, housewives, neighbors and journalists by offering several guided tours to the site, led by biologists. This means activists fleetingly used the wetland as a social arena for ecological knowledge. Here, biologists pinpointed species found in this habitat, hence appealing to emotions as citizens discovered they live pretty close to different species of birds and mammals. This human and non-human connection proved to be a powerful tool in the aforementioned struggle of El Zanjón del Burro (*comuna* 22, high-class area of Cali). Although this case is not part of this research, it makes the discussion richer. As one of the leaders explained:

> *"La experiencia cercana de la gente con los animales como los guatines y los lobos fue muy importante para nuestra narrativa de protección. Esos animales se convirtieron en testimonio de que estábamos defendiendo un área que valía la pena proteger, a pesar de los argumentos opuestos que existían [construcción de una vía]. Nuestra estrategia fue muy técnica pero también apeló a las emociones de la gente. Una artista del barrio diseñó esculturas de guatines para vendérselas a las personas interesadas en apoyar nuestra movilización.". Entrevistado 19.*
>
> [translation] "Close experiences of people with animals such as *guatines* and foxes proved to be very important for our protective narrative. Those animals became a testimony that we were defending an area worth protecting—despite opposing arguments [an area for motorways]. Our strategy was very technical but also emotional. A neighbor artist designed *guatín* sculptures to be sold to people interested in supporting this mobilization." (interviewee 19).

Nowadays, the idea of turning the wetland into a social arena is targeting universities. One of the activists (interviewee 17) is teaming up with faculty members to encourage students develop research projects in this new 'ecological laboratory'—a resourceful strategy considering this site has limited access. Finally, possible futures are not yet projected by activists, for instance, proposals to manage the area as an ecological node or defining compensations in the event works continue.

4.1.1. Wrapping up

Value-creating processes were strong in both cases yet only El Cortijo Wetland struggle engaged the majority of the public and managed to convene a right-to-the-city conversation. The Meléndez River struggle employed quite a set of artifacts and social arenas—including the 2011's verdict, a Legal Act of unquestionable hierarchy, and scientific reports—yet only partially succeed. Here, an area was designated but a highly

valued hill was taken up for housing development. This speaks of what sociologist and cultural philosopher Michael de Certeau referred to as *tactics*: ingenious ways in which the powerless make use of the strong (Gardiner, 2000).

> "(…) whatever it [tactic] wins, it does not keep. It must constantly manipulate events in order to turn them into opportunities. The weak must continually turn to their own ends forces alien to them." (Certeau, 1984).

Additionally, the riverbanks are still occupied, and gradually-freed spaces are not yet restored because action will be only taken the whole area becomes available—not plot by plot (interviewee 2). Overall, governance over the Meléndez River basin is still an unmastered problem in the city of Cali.

In contrast, protective capacity and management capacity in El Cortijo Wetland struggle exhibited considerable constraints, but awareness city-wide was larger and works are still blocked. Although the protective narrative was simplified, since the notion of a hydrological system as a whole is not yet internalized, leaders conveyed a unified discourse in social arenas. The core message was that construction works were threatening a wetland and remnants of Tropical Dry Forest, both essential assets for human well-being and urban biodiversity. Secondly, activists chose whether to fight in the legislative, administrative, judicial or social arena, being the latter two the crucial ones. This outcome might be explained by the social composition of El Cortijo Wetland leaders (scholars, practitioners, activists), how they decided to articulate values and the financial possibilities lying before them. Thirdly, this site is not in an area as contested as the Meléndez River considering its history of land appropriation and informal settlements, as well as its natural composition and exposure to natural risks (Chapter 2).

In addition to the social composition of leaders and location of El Cortijo Wetland case study, one can speculate that the timing of this struggle itself also favored the narrative. This refers to the 'readiness' of the city by the time this protective narrative came to the forefront. Political Scientist E. E. Schattschneider points out "the outcome of every conflict is determined by the extent to which the audience becomes involved in it" (1960, p. 189). It is likely that, after struggles such as El Zanjón del Burro in 2016, in which *caleños* witnessed how local value-creation processes could have an impact on city planning by stopping motorway constructions, citizens were more responsive and sensitive towards protective narratives built by advocates.

Keeping momentum and sympathizers engaged was hard for the RMUS activists. Different visions towards the Meléndez River probably caused the problem to appear

'just' as a conflict for water availability due to new urbanizations, downplaying ecology-centered narratives. Again, value-creation process was sound in terms of artifacts and social arenas. Since 2008, the mobilizations of the Meléndez River have been covered by media, yet the involvement of most of the population is still unnoticeable nowadays. Paradoxically, the Carnival for Life was thought out as a remembrance of the Meléndez River, hoping to revive values in the *caleño* memory. This social arena gathered 5.000 people and still, the social-ecological potential of this site remains unfamiliar to *caleños*.

4.2. An ecological network perspective

This section describes how the framework under reference helps to move between scales of analysis: value articulation and ecological complexity.

In particular, I here dive a bit deeper into how each case study relates to the Ecological Main Structure—EMS, a top-level planning instrument in Colombian municipalities. The EMS of Cali "guides processes of conservation and restoration of ecosystems, ensuring their continuity and connectivity through environmental corridors, protected areas and other conservation strategies, which in turn contribute to adaptation to climate change." (DAPM, 2014, p. 712).

Along with figures 17 and 18 further down, table 9 illustrates how both case-study sites add to the ecological complexity of the city, this is, how these ecological nodes relate to a broader ecological system. This reflection is supported on EMS ecological principles of permeability, transition, connectivity and continuity, ecosystem approach and the urban-rural relation. Table 9 also highlights how the EMS, as a top-down planning instrument, excludes environmental values articulated by advocates (see rows filled in green).

Table 9. Breaking down Cali's Ecological Municipal Structure in correspondence to both case studies.

Elements of the Ecological Municipal Structure (EMS)	EMS' elements within or in proximity of case study sites	
	Case study site 1	Case study site 2
1.National Natural Parks (NNP)	*Los Farallones* NNP (fig. 4, 17)	
2.National Protective Forest Reserve (NPFR)	NPFR of Cali (fig. 4, 17)	
3.La Laguna Civil Society Reserve		
4.SIMAP Areas	RMUS	
5.SIMAP Areas to be designated	*Aguarrús–El Faro*	
6.Environmental Corridors	Meléndez River	Lili River
7.Buffer zone Los Farallones NNP	*Los Farallones* NNP ((fig. 4, 17)	
8.Environmental zone Cauca River		Cauca River (fig. 3, 18).
9.Ecological belts		*Navarro* Ecological Belt
10.Forests and *guadales*	Forest relicts (>5ha) and remnants	Tropical Dry Forest remnants
11.Ecoparks, parks, regional and urban green areas	*La Bandera* Ecopark *El Ingenio* Park	
12.Public and private conservation initiatives	Pichincha Military Complex EMCALI's plots for water protection Club Campestre	
13.Hills with landscape and environmental value	*La Bandera* Hill *El Morro* Hill	
14.Superficial hydrological system (wetlands, rivers, streams, springs)	Several water bodies	El Cortijo Wetland
15.Aquifer recharge area in rural lands		Hydrological network of the site
16.Elements of the public space	Meléndez Lineal Park Zone for Public Use in the *Rivere* of the Meléndez River	
17.Elements of urban facilities (schools, clubs, etc.)	Pichincha Military Complex Club Campestre Universidad del Valle	
18.Elements of the pluvial drainage system	Channel in *comuna* 18	Channels associated with the *Cali-Jamundí* highway
19.Elements of the mobility system		Navarro Ecological Belt
20.Landscape ecological management tools (rural lands)	Payment for ecosystem services in *Villacarmelo corregimiento* (upper basin of Meléndez River)	Units of Rural Planning (UPR) *in El Hormiguero corregimiento*

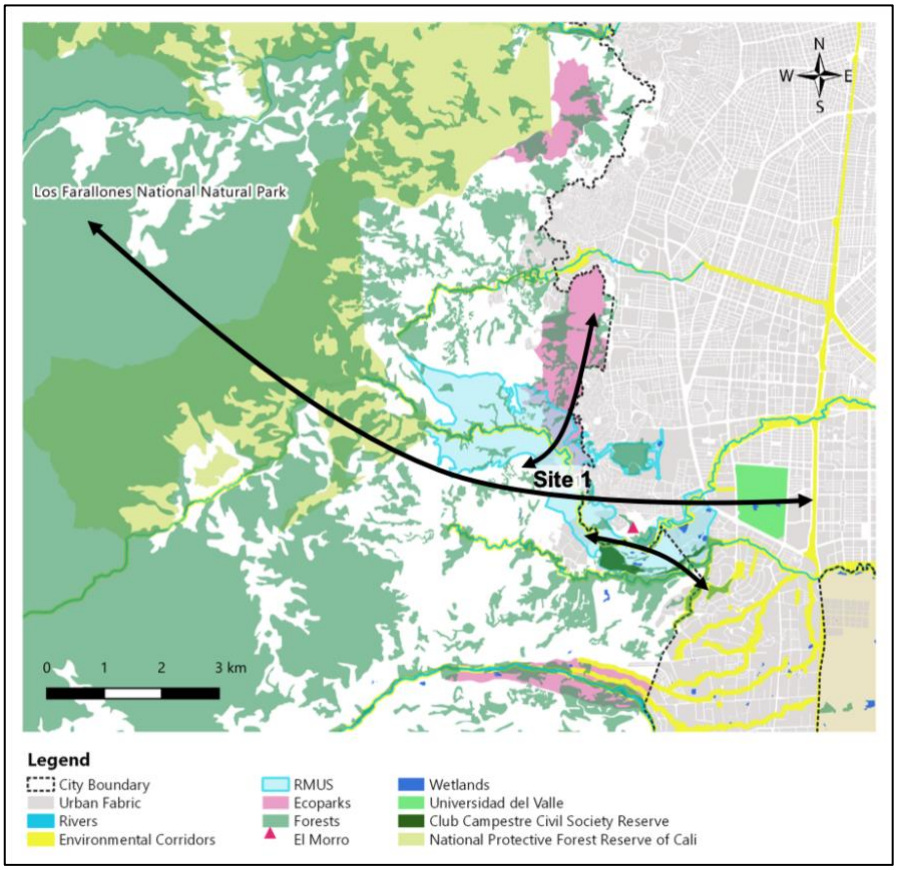
* In Cali, the EMS is complemented by the Ecological Complementary Structure, both framed under the Ecological Municipal Structure. The EMS contains elements from 1 to 15, and the Ecological Complementary Structure elements from 16 to 20.

Elements within case-study sites
Elements adjacent or in proximity to case-study sites
Areas in need of protection according to advocates but excluded in the POT

4.2.1. The RMUS and beyond

The RMUS could position itself as an example of an urban-rural border strategy in one of the most conflicting areas of informal settlements in Cali, specifically by adding forces with *Las Banderas* Eco-Park. The RMUS is crucial to sustain ecological flows between the urban fabric (*Universidad del Valle* campus, *El Ingenio* Park) and the massive ecological nodes to the west i.e., National Protective Forest Reserve of Cali and Los Farallones Natural National Park.

Figure 17 Ecological relations of the RMUS to broader landscape elements.



Data source: DAPM, 2014. Map and arrows assembled by the author.

The RMUS proves to be pivotal in this context if one is to acknowledge that protected areas and natural reserves come short to ensure biodiversity conservation in cities (Colding, Lundberg, & Folke, 2006). Not to mention the financial and governance constrains they face to achieve effective management, for instance the 'Thomas van der Hammen Reserve' in Bogotá City. Such aspects pose questions to how the matrix surrounding urban protected areas—and their management practices—contribute to biodiversity conservation. In 2011, Biologist Taylor H. Ricketts estimated how the type of interpatch matrix lead to patch isolation. Parch isolation is a parameter traditionally measured solely as distance between patches. However, results proved that the type of intervening matrix can significantly influence effective isolation of habitat patches—

which entails to think beyond distance itself. Moreover, results challenged prominent conservation measures focused on remnant fragments, and stepping stones and corridors as "it often may be more feasible to reduce effective isolation of fragments by altering management practices in the surrounding matrix than to reconnect them with restored corridors" (p. 97).

The RMUS Environmental Management Plan sheds light in this regard. The plan was built upon the principles of connectivity, representativeness, ecosystem approach and urban-rural relation. Based on regional birdlife conservation criteria, the plan sought to maintain fragments of different sizes and encourage connectivity between them so that migratory movements, dispersion, pollination, nutrient flow, among other ecological processes can unfold. For highly transformed areas, the plan placed emphasis on restoring linear elements scattered in the matrix e.g., rivers and streams, and links between forests' relicts; whereas in areas transformed less than 40%, the goal was to maintain fragments and their connections (DAGMA, TNC, Fundación Danza y Vida, & Corporación Biodiversa, 2014, p. 270). If *El Morro* could have overcome housing project conflicts, it would have remained among the fragments in need of protection, thereby providing habitat to functional groups for seed dispersal and pollination (*Ortalis columbiana, Aotus lemurinus, Manacus manacus, Dasyprocta punctata*).

In terms of practices, the Environmental Management Plan fosters restoration, preservation, environmental research and education, eco-tourism, sustainable food production, among other activities. In 2014, a co-management committee was established to ensure the plan's implementation. The committee congregates public and private actor groups and links different levels of governance, from regional to the local scale: CVC (rural lands, regional), DAGMA (urban lands, city scale), *Apromeléndez* and *Aprocuencas* (community-based organizations focusing on the Meléndez River basin) and thematic committees of *comuna* 18 and *corregimiento La Buitrera* (local scale). This scheme is therefore a platform upon which actor groups who interact with nature at different spatial scales can meet. Consequently, the co-management committee can be seen as an "overall strategy of how emergent social networks can be harnessed for dealing with scale mismatches and the management of ecosystem services across the landscape" (Ernstson, Barthel, Andersson, & Borgström, 2010, p. 12).

Although the plan is meant to be a navigation chart, real-life implementation and consensus around it remain challenging. For instance, the City Mayor recently announced the construction of an urban park in collaboration with *Club Campestre* and Fanalca Foundation. Since the park compromised an area that was initially designated for 'ecological restoration' purposes, last year the City Administration modified the RMUS'

zoning with dubious support from community members. This event might be linked to what interviewee 1 mentioned about the flexibility that underpins the RMUS' designation—a reserve for the sustainable use of the river might provide room to 'adjust' conservation priorities in sake of development projects.

A second front to speculate how local dynamics impact the generation and distribution of ecosystem services city-wide—besides connectivity based on forest coverage—is the river's hydrological system. The system provides water to roughly 300.000 people in Cali City (DAGMA, TNC, Fundación Danza y Vida, & Corporación Biodiversa, 2014). Due to resource depletion in the lower basin, EMCALI, the public services agency, has even considered installing a new interceptor upstream instead of radically commit itself to restoring and rehabilitating the ecosystem functioning.

Community-led efforts vary along the basin. During the field work it was possible to identify three pro-nature initiatives upstream (*corregimiento* Villacarmelo) led by better-resourced groups. *Mariposario Azul*, *Mercado de la Montaña* and *Reserva Colibrí* are initiatives engaged with environmental education, eco-tourism and agroecology, ultimately protecting the river. However, as the river flows downstream (*comuna* 18 and *corregimiento* La Buitrera), ecosystem functioning, water quantity and quality are ranked as 'poor' (ibid), a picture that reinforces the claim of activists pushing forward the 2011's verdict.

Yet excessively optimistic, if thoroughly implemented, both 2011's verdict and RMUS' Environmental Management Plan could bring back to *caleños* the glorious Meléndez River. This is probably the most significant contribution protective narratives and stewardship of nature in *comuna* 18 and *corregimientos* La Buitrera and Villacarmelo can offer city-wide. A contribution in the sense of ecosystem services but also in terms of identity and legacy of natural and cultural histories.

The RMUS' case study perfectly mirrors the contested setting in which the EMS operates. Housing developments—backed up by the POT—are taking place on areas highly valued by locals. Notice that *El Morro* is not indicated in table 9 under the category "Hills with landscape and environmental value" of the EMS. However, locals defined *El Morro* as a viewpoint, a place for community engagement, a site of historical and cultural importance and overall, a key piece of nature (or node) shaped by water springs, relicts of Tropical Dry Forest and endemic species. Values are summarized in table 10.

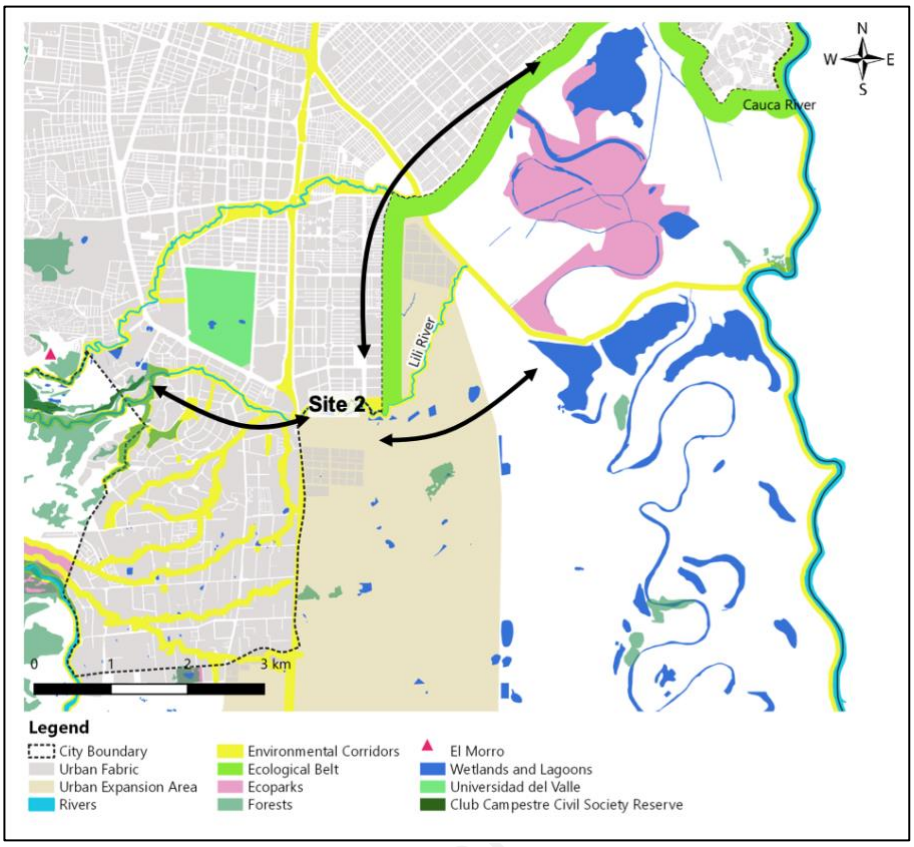
4.2.2. El Cortijo Wetland: an invisible assemblage

The POT's cartography didn't address landscape elements associated to El Cortijo Wetland. According to the framework supporting this research, this 'omission' implies low protective capacity of this specific node. As things were standing in 2011, on paper, apart from the Lili River, further EMS' elements (wetlands, streams, forest coverage) were not compromised by the South Terminal Project's Partial Plan. The project therefore seemed ecologically harmless, but it didn't take long for contradictions to come up.

The POT fosters restoration and biodiversity conservation, prioritizing wetlands and Tropical Dry Forest areas (DAPM, 2014, p. 630). Additionally, for the area concerning this case study, the POT establishes "the occupation of water rounds in areas of urban expansion should ensure the flow and temporary storage of water and sediments associated with streams and water bodies giving priority to hydrological, ecosystem and geomorphological dynamics raised through this guide" (p. 799).

When referring to *corregimiento* El Hormiguero, the POT urges the designation of soils to create ponds thus increasing El Hormiguero's ability to absorb shocks during rainy seasons, especially floods of the Cauca River and its tributary waters (p. 858). One might argue that prior to create ponds for flood prevention, it is mandatory to protect the current hydrological system and make it more resilient by tying up pieces of nature in *comunas* 17, 18, 22 and *corregimiento* El Hormiguero. Possible strategies in this regard are vegetated corridors e.g., water-protection riparian strips, wildlife-movement routes, and walking-trail routes to connect the large patches (Forman, 2008, p. 39).

Figure 18. Ecological relations of El Cortijo Wetland to broader landscape elements.



Data source: DAPM, 2014. Map and arrows assembled by the author.

However, the EMS doesn't spot El Cortijo Wetland and its surrounding vegetation as a focal area for water regulation, one that links west Cali (aquifer recharge area) to the eastside (aquifer discharge area). The POT neither addresses the idea of an eco-village-development type in *comuna* 17, adjacent to the wetland. All in, the assemblage that advocates tried to tie up is invisible to the eyes of the City Administration. The idea of this wetland being part of a wider system is not yet internalized or not straightforwardly communicated. For instance, environmental authorities don't touch upon the opportunities to link El Cortijo to the 100 meters-wide Navarro Ecological Belt (Fig. 18), or to *Valle del Lili*'s public space nor to rural wetlands.

As in the first case study with *El Morro*, here, the EMS discloses contested values: those created on the ground by advocates, and those articulated from top-down perspectives (table 10). Artifacts and social arenas helped advocates to craft this protective narrative; to create new ecological and cultural values towards a site no one knew about before.

4.3. Environmental justice and ecosystem services

El Morro struggle draws attention in terms of environmental justice. *El Morro* is crucial not only in ecological terms, but because what it means for the local community. The hilly part of *comuna* 18, described in the POT as 'urban unconsolidated dense' (p 124), has three major green areas with important forest coverage: *Club Campestre*, Pichincha Military Complex and *El Morro*, yet only the latter has public access as it is part of the "Zone for Public Use in the *Rivere* of the Meléndez River" (Municipal Agreement 059, 1968). Actually, the exercise of social cartography led by *Corporación Biodiversa* concluded:

> "This list [civil initiatives and organizations] makes evident two aspects: on one hand, inhabitants of *comuna* 18 don't have parks or recreational areas gear up and equipped by the City Administration. *El Morro* then becomes the place where families and young people can perform recreational activities. The upcoming designation for protected areas in *comuna* 18 should definitely take into account this demand for nature and public space. A second aspect is the active participation of this community to defend their territory." (DAGMA, TNC, Fundación Danza y Vida, & Corporación Biodiversa, 2014, p. 71).

Although it is true that local knowledge and practices help sustain ecological processes in broader scales (Colding, Lundberg, & Folke, 2006; Andersson, Barthel, & Ahrné, 2007), *El Morro* struggle is a localized claim for the right to nature, human health and entertainment. Moreover, a claim in a low-income, working class area of Cali. This situation pushes the boundaries of the a-political assumption that ecosystem services are generated and distributed on equal basis city-wide.

Finally, it is important to refer again to Cali's historical pattern of unequal geographies. *El Morro*, the RMUS and broadly speaking conflicts linked to the Meléndez River are all rooted in a history of unequal land appropriation. Actor groups who have governed the city have accumulated a titanic debt with less-favored groups. If one digs into this discussion and traces it back in time, it becomes clear that activists of the Meléndez River (all three mobilizations described in Chapter 2) are actually claiming back lands that were initially public: the *Ejidos*. No interviewee overlooked this situation. At the spine of the colossal number of objection letters is the fact that, regardless how activists name it (Cusezar, Marval, Club Campestre, etc.), land appropriation is the most pressing problem here. And this is a 'pattern' insofar it is reproduced in all urban rivers of Cali, specially Pance, Cali and Cañaveralejo. Social and environmental injustices linked to rivers in Cali is not an isolated problem, it's a city crisis.

4.4. Adding to the framework: clientelism

Both case studies showed internal frictions due to accusations on how personal interests of some leaders interfered with the protective narratives in different moments of time e.g., level of participation, engagement, respect to group agreements. This refers to circumstances in which leaders held positions of popular election, or their livelihoods somehow depended on state-led projects and political connections. Both case studies analyzed in this research exhibited, to some extent, this situation. Not El Zanjón del Burro struggle though, a very-high-income area. There, advocates strived to fight from a technical domain and although they relied on their social capital—connections to people holding important positions, etc.—, their livelihoods didn't depend on the course of local politics.

There is no evidence nor was the purpose of this research to explore how environmental justice and protective narratives relate to local politics. However, both cases were comprised of contradictory and multiple logics beyond the solely aim of protecting nature. Either clientelist ties to power brokers or the use of protective narratives to legitimize unsustainable practices (for instance, informal land appropriation). This brief reflection seems in line with a tradition of clientelism and social inequalities in Latin American societies.

5. Concluding remarks

By developing a view of a city as an ecological network, where nodes have different levels of protective capacity and management capacity, this framework portrays how place-based struggles impact the ecological outcome of the city. This, of course, becomes a more complicated analysis but also closer to the reality, if one is to address ecosystem services in relation to environmental justice.

The framework offers a meeting point between commonly disarticulated approaches: environmental justice and ecological complexity; political ecology and ecosystem services; social justice and resilience; power relations and value articulation. This research touched upon all of them.

Taken together, both analytical modes revealed contested geographies in Cali. Based on the Ecological Main Structure (EMS) of Cali (2014), a top-level planning instrument for municipalities in Colombia, relations between Cali's ecological network and value-creation processes were drawn. This analysis revealed contested values: those articulated grassroots up and those coming from top-down perspectives. On this ground,

social mobilizations somehow filled the 'gaps' in the EMS, hence making urban nature management a more democratic practice. Ultimately, what advocates addressed was a the-right-to-the-city conversation in terms of claiming their role in attach new meanings to the space and participate in its production.

Table 10. Values mobilized by both protective narratives, based on objection letters, news archive, technical reports, and interviews

	Case study 1. Municipal Reserve for the Sustainable Use of the Meléndez River (RMUS), emphasizing *El Morro* struggle.	**Case study 2.** El Cortijo Wetland and its area of influence.
Values embedded in the POT.	RMUS' land-use (the RMUS excludes *El Morro)*: - Sustainable use - Restoration - Preservation Development projects envisioned in the lower-medium basin of the Meléndez River: - Low-income housing	Land-use: - Urban expansion Development projects envisioned on the site: - Transport infrastructure and commercial establishments.
Values embedded in the protective narratives created by advocates	Ecological values - Habitat provision. Biodiversity connectivity and endemic species. - Relicts of Tropical Dry Forest. - Wetlands that regulate the hydrological cycle of the Meléndez River and its running waters. - A 37m2 artificial lake in the *Golfito* area with fishes, fed by hand-made drainages. - "A green lung for the city". Socio-cultural values - Mini golf (or *golfito*) with 10 holes. - Ecological Kite Festival. - Sports and trekking. - A viewpoint to enjoy skyline views for sunset. - A place of historical and cultural importance because it was a pre-Hispanic settlement, with a few archeological finds.	Ecological values - Biodiversity and ecosystem services attached to an unknown wetland (refuge of native flora and fauna, habitat of many migratory bird species, regulation of hydrological cycle, flood prevention). - The wetland also helps to mitigate pollution of underground water due to lixiviates from former landfill site *Basuro Navarro.* - Remnants of Tropical Dry Forest with flooded areas inside. - Vegetation species of national interest (bromeliads, orchids, mosses, liverworts and lichens). Socio-cultural values - Tranquility, relaxation, mental health, recreation and sports. - Cultural heritage (cemeteries of black communities in colonial times and a place for *Indios Lilíes* during pre-Hispanic times).

Furthermore, this research addressed how power relations made certain voices—or values—prevail upon others. To this end, this investigation explained how activists mobilized artifacts, social arenas and protective narratives, and demonstrated that value-creating processes are essentially social processes shaped by power relations. By creating new values, protective narratives analyzed in this research contributed to the re-signification of places and gave new meaning to human-nature relations in Cali.

Environmental justice and resilience. Both case studies made evident the concept of social-ecological resilience lacks an explicit environmental justice perspective. Even if the RMUS' plan is thoroughly implemented and Metrocali develops an environmental plan for the South Transport Terminal, it's not clear how these novel ecosystems will respond to social justice. *El Morro* is the most dramatic case in regard.

The concept of social-ecological resilience was developed after studying social responsiveness to environmental change (Folke, Hahn, Olsson, & Norberg, 2005); it refers to the way local knowledge is incorporated to maintain the generation of ecosystem services. However, it disregarded the distribution of (and access to) those benefits might reproduce unjust social structures (Ernstson, 2013, p. 15). A system can be resilient so long as it maintains the generation of ecosystem services, but it may not necessarily be just. The framework under reference agitates issues of power, justice and distribution of benefits, largely missed in the ecosystem services metaphor.

Does the level of protective capacity explain why an area is targeted for development? A hypothesis based on this framework would be "(…) exploitation pressure, which is driven by socio-economic processes, would seek out those green areas with lowest protective capacity, and highest profit value." (Ernstson, 2013, p. 14). This premise was true for El Cortijo Wetland yet not for the RMUS and *El Morro*. The latter held a significant level of protective and management capacity, yet political powers found a way to keep developing the area.

Who is fighting in each case? It is important to highlight what was at stake in each case study site, socially speaking. *Comuna* 18 is highly populated and has a considerable social deficit which makes it one of the most appealing arenas for politicians to run campaigns. Candidates for City Mayor know that if they compromise with urban facilities, water sewerage, public space, etc., *comuna* 18 voters will certainly move the meter in their favor during the elections. This area has historically been a target for broken promises (interviewee 2). As described in Chapters 3 and 4, despite thirteen years of civil mobilizations, social and environmental justice still elusive goals. The South Transport Terminal in *comuna* 17 will affect people living in this *comuna* in terms of air and noise pollution, green areas and it will probably devaluate their properties. But livelihoods as such are not as vulnerable as in the first study case, or El Zanjón del Burro example.

The ecological network approach should work as an invitation to move across scales while seeking a common interest: connectivity. For more effective action, the stakeholders involved in green area management in Cali need to engage in closer dialogue. The EMS needs to better aligned with social mobilizations and sectorial policies. Also, environmental authorities in urban and rural lands must find ways to overcome administrative boundaries and cooperate towards consolidating an ecological network, one that traces connections across jurisdictions. Here, different sets of knowledge are essential: non-profit organizations, technical bodies and citizens could act as scale-crossing brokers or middle scale managers (Ernstson, Barthel, Andersson, & Borgström, 2010).

A decisive moment for Cali's urban planning. On one hand, Cali can now rely on a fair number of master planning tools to engage with urban biodiversity and urban ecosystem services (Instituto Humboldt, 2017). In 2014, the City Administration defined its Ecological Main Structure (EMS) and on top of this, it developed the SIMAP. The SIMAP aims at implementing the EMS with citizen and institutional participation. This means that beyond a map of polygons (EMS cartography), the SIMAP explores a range of possibilities—mechanisms and institutional arrangements—so that different actor groups can engage and come to agreements to undertake conservation measures (interviewees 9 and 22). In other words, the EMS indicates *what* to protect and the SIMAP *how* and with *whom*.

Secondly, social awareness towards nature is really strong in Cali, an aspect that should be advantageous when it comes to green areas management. *Caleños* have historically used their rivers for recreational purposes; protected areas are experienced as nature-human meeting points; forests in the urban and rural lands of the city are social arenas for learning (for instance, bird watching groups play an important role in the city); and urban trees are highly valued and protected by the city residents (DAGMA, TNC, & Corporación Biodiversa, 2012).

Additionally, this research analyzed two important social mobilizations to protect urban nature, and briefly touched upon a few more. One could expect the City Administration to take advantage of this pro-nature attitude and activism to set ecologically ambitious policies. However, conservation is jeopardized by poor law enforcement, the lack of dialogue with communities and the absence of ecologically sound urban designs (most of the interviewees agreed on this point). For instance, recreational use of Cali's urban rivers, seven in total, is now limited to one—Pance River—although not for too long. Based on the investigation developed by Ecology Economist Mario Alejandro Pérez and colleagues (2014), water supply of the river is critical and water consumption is

concentrated in high-income groups (socioeconomic strata 5 and 6) who have raised country houses in southern Cali. This case is reported in the Environmental Justice Atlas (https://ejatlas.org/).

Now, regarding ecologically sound urban designs, the POT defined south Cali as an area for urban expansion but also crucial for wetland restoration and management. Where is the urban design meeting both needs? Some may argue this is done through Partial Plans or *planes parciales*. A Partial Plan is a planning instrument to materialize urban development in 'doable' scales. These plans aren't too broad to cover the entire city nor too narrow to focus on a single plot (Alcaldía de Medellín, 2007). However, based on the case study of El Cortijo Wetland and the South Transport Terminal Partial Plan, one can easily conclude that a comprehensive, ecologically sensitive design for this area is not in the radar of the City Administration.

Finally, and ironically, the outcome of different protective narratives might be conflicting. Social mobilizations to protect the Meléndez River are such an example. Along this research I have mentioned how both, 2011's verdict and the RMUS designation are tools to increase the Meléndez River and *El Morro*'s protective capacity. However, both 'victories' imply different strategies to protect the river basin. On one hand, the verdict of 2011 compromises at least four different institutions (three are local, one is regional) and substantial sums of technical and financial resources to carry on structural solutions e.g., census of informal population and re-settlement, large-scale ecological restoration, etc. On the other, there is the RMUS' plan of 2014. Both were the result of three mobilizations taking place in one river, however,

> *"El plan de manejo ambiental al que hace referencia el fallo de 2011 no tiene nada que ver con el plan de manejo ambiental de la RMUS. El del fallo está orientado a resolver un problema: recuperar la franja protectora del río Meléndez y reubicar a las personas que en este momento ocupan la zona, mientras que el plan de la RMUS propone alternativas de uso del suelo… Y de hecho, algunas veces, este último puede agravar el problema.". Entrevistado 10.*
>
> [translation] "The environmental management plan addressed by the verdict in 2011 doesn't relate to the environmental management plan of the RMUS. The former is oriented to solve a problem: to free the Meléndez River protective strips and re-settle people, whereas the latter proposes land-use alternatives. And sometimes, the latter may even sharpen the problem.". Interviewee 10.

Social production of urban ecosystem services in Cali and Latin America. As most cities in Latin American, Cali is also characterized by rich biodiversity, social inequalities, an intricate institutional system and historical record of violence (number of homicides). However, cities in this region have also come with urban innovations, some which are globally known by now, for instance community-led urban conservation[14] or initiatives linking urban sustainability to human health[15]. The framework under reference comes as an opportunity not only to unpack power relations that rule our urban natures but as an invitation to think urban biodiversity on the basis of social inclusion. In a region marked by historical inequality, urban nature can be a vehicle upon which different values reconcile. As described along this investigation, although challenges are monumental, planning tools now available and the impetus of social mobilizations pose hope. On these grounds, it is essential to move the urban ecosystem services approach towards a more politically centered debate, one that explicitly addresses environmental injustices and power asymmetries, to then reflect how urban nature can be a social venue for everyone.

Research linking social justice, value articulation and nature in urbanized landscapes—as complex—is unquestionably crucial in Colombia and broadly speaking the region. A set of cases studies in Latin American cities could better portray commonalities but also speak of the specificities on how different forms of politics—class, ability, race—shape our urban natures. This framework is therefore an invitation to expand and problematize our understanding on how people and urban nature relate—not a simple endeavor but certainly a crucial one in our time.

[14] Nonprofit organization *Fundación Humedales de Bogotá* is now being targeted by activists in Latin America (for instance, *Red Ciudadana por los humedales-Valdivia* from Chile) due to their work in community-based wetland conservation. In 2015, this group of passionate young activists was awarded the Young Wetland Champions Award by the RAMSAR Convention.
[15] Examples here are the weekly *ciclovía* in Bogotá (a network of car-free streets throughout the city), or workout routines in the public space in Brazil, known as *Academia de Cidade*.

6. Literature

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ANNEX 1. Overview of empirical material

Table 1a. Interviews and other material

#	Role of interviewee	Sex	Education of interviewee	Age	Date(s) of interview(s)	Location	Duration	P.
Case study 1) Municipal Reserve for the Sustainable Use of the Meléndez River (RSUM)								
1	Manager. Local leader since 2008. Manager. President of *Apromelendez* (representing the Comuna 18).	M	Technological	30-40	01.12.2018	Las Garzas Ecopark	1h	R, T
2	Environmnental Educator. Local leader. Member of *Apromelendez* (representing *La Buitrera*). Member of the Women's Table (*Mesa de Mujeres*).	F	Technician	50-60	01.12.2018	Las Garzas Ecopark	1h	R, T
3	Environmental Manager. Former Coordinator of the Environmental Committee of Comuna 18. Member of *Aprocuencas.*	M	Technician	30-40	03.12.2018	Café in Cali City	2h	R, T
4	Manager. Political leader (*Edil*) of *Comuna* 18. Former member of *Apromelendez*. Co-funder of *Aprocuencas.*	F	Technological	50-60	07.12.2018	Interviewee´s home	2h	R, T
5	Mechanical. Local leader who filed the Popular Claim to protect the river (*Acción Popular*) in 2006. One of the first families living in Comuna 18.	M	Highschool	50-60	06.12.2018	Café in Cali City	2h	R, T
6	Ecologist. He was the legal advisor assiting interviewee No. 5 to filed the Popular Claim in 2006. Since the age of 16, he has advocated for urban rivers in Cali.	M	BA	50-60	30.11.2018	Universidad del Valle	1h	R, CD
7	Biologist. Director of *Corporación Biodiversa,* non-profit organization in charge of the technical assessment for the RMUS' designation. *Biodiversa* acted as a scale-crossing broker throughout this area designation.	M	Master	40-50	10.12.2018	Interviewee´s office	1h	R, CD
8	Biologist. Researcher at *Corporación Biodiversa,* she co-led most of the participatory workshops and sampling activities with locals from Comuna 18 and *La Buitreta*.	F	Master	40-50	03.12.2018	Universidad del Valle	1h	R, T
9	Biodiversity and Forest Manager. Director of the Ecosystems' Division at DAGMA as (Cali's Environmental Authority) of 2014. DAGMA's support was crucial to nail the RMUS process, as the call from TNC's *Colombia Conserva Project* required: (i) civil support, (ii) governmental support, and (iii) a technical body (*Corporación Biodiversa*).	F	Master	40-50	13.12.2018	Interviewee´s home	2h	R, CD
10	Agricultural Engineer. Advisor at the Ecosystems' Division at DAGMA, he supports monitoring and evaluation of the RMUS´ Environmental Management Plan.	M	BA	40-50	13.12.2018	Interviewee´s office	1h	R, CD
11	Environmental Manager. Advisor at the Ecosystems' Division at DAGMA, she supports monitoring and evaluation of the RMUS´ Environmental Management Plan.	F	Master	30-40	13.12.2019	Interviewee´s office	1h	R, CD
	Other materials include: Technical reports, planning documents from the City of Cali, Environmental licenses issued by the City of Cali, objection letters from the community i.e. Popular Actions, Rights of Petition (*derechos de peticion*), letters from environmental, planning and housing authorities of the City of Cali, newspaper articles, Youtube videos i.e. interviews with local leaders, documentals, newscasts reports, Master thesis, outreach material (i.e. flyers, posters).							
Case study 2) El Cortijo Wetland								
#	**Role of interviewee**	**Sex**	**Education of interviewee**	**Age**	**Date(s) of interview(s)**	**Location**	**Duration**	**P.**
12	Trader. Local Leader. Co-funder and active member of the movement in defense of El Cortijo Wetland.	M	Technician	30-40	06.12.2018	The Resistance Tent *(La Carpa de la Resistencia)*	1h	R, CD
13	Economist and University Lecturer. Local leader. Co-funder of the movement in defense of El Cortijo Wetland.	M	PhD	40-50	03.12.2018	Univerisidad del Valle	2h	R, T
14	Trader. Local resident and holder of El Cortijo lot, he has independently filled a colosal number of Popular Actions claiming irregularities in the adquisition of the lots for the South Transport Terminal Project.	M	Highschool	40-50	02.12.2018	Excursion in El Cortijo	3h	R, CD
15	Manager. President of the Board of Communal Action (*Junta de Acción Comunal*) of *Comuna* 22.	F	BA	40-50	06.12.2018	The Resistance Tent *(La Carpa de la Resistencia)*	1h	R, CD
16	Lawyer. Local leader, he is one of the four attorneys of this case before legal bodies at the national, regional and local levels.	M	BA	50-60	06.12.2018	The Resistance Tent *(La Carpa de la Resistencia)*	1h	R, T
17	Biologist. Currently one of the most active leaders of the movement, establishing links between universities and the site.	M	Master	40-50	06.12.2018	The Resistance Tent *(La Carpa de la Resistencia)*	1h	R, T
18	Engineer. Advisor at *MetroCali,* Cali's transport company. She leads the Environmental component of the South Transport Terminal proyect.	F	Master	30-40	14.12.2018	Interviewee´s office	2h	R, CD
	Other materials include: Technical reports, planning documents from the City of Cali, Environmental licenses issued by the City of Cali, objection letters from the community (i.e. Popular Actions, tutelas, letters from environmental authorities of the City of Cali, newspaper articles, blog posts, Youtube videos (i.e. newscasts reports, etc.), Facebook, documents of synthesis assembled by the community (power point presentations, etc.).							

Further place-based struggles in Cali to protect urban nature (El Zanjón del Burro and La Babilla Wetland)								
#	Role of interviewee	Sex	Education of interviewee	Age	Date(s) of interview(s)	Location	Duration	P.
19	Sociologist. University Lecturer and environmental activist.	F	PhD	40-50	10.12.2018	Excursion to Zanjón del Burro green corredor	3h	R, CD
20	Physician. Independent professor and environmental activist.	M	BA	40-50	10.12.2018			
Understanding Cali's ecological context								
#	Role of interviewee	Sex	Education of interviewee	Age	Date(s) of interview(s)	Location	Duration	P.
21	Lawyer and Environmental Scientist. Current General Director of DAGMA.	F	PhD	50-60	07.12.2018	Café in Cali City	1h	R, CD
22	Ecologist. Advisor of the Municipal System of Protected Areas, SIMAP (*Sistema Municipal de Áreas Protegidas*) as of 2012.	F	Master	30-40	12.12.2018	Café in Cali City	1h	R, CD
23	Ecologist. Advisor at the Planning Department of Cali (DAMP) between 2013-2016.	F	Master	40-50	05.12.2018	Interviewee´s office	2h	R, CD
24	Architect. Project Director of the Green Corredor Master Plan, designed by *Espacio Colectivo Arquitectos* in Cali.	M	BA	40-50	10.12.2018	Interviewee´s office	1h	R, CD
25	Manager. Founder of the Mountain Market initative (*Mercado de la Montaña*), a platform bringing together local food producers, from traditional families to leaders boosting private natural reserves along the upper basin of the Meléndez River.	M	BA	50-60	15.12.2018	Excursion in *Mercado de la Montaña*	2h	R, CD
26	Environmental Educator. Founder of the Masters of Water Foundation (*Maestros del Agua*), an initiative seeking to empower local communities to protect the urban rivers of Cali.	M	Master	60-70	05.12.2018	Library in Cali	1h	R, CD
27	Artist living in Comuna 18. Knowledgeable of the ancentral memory of the Meléndez River. Member of the City Committee definig the Master Plan for the Meléndez, Lili and Cañaveralejo rivers.	M	Highschool	50-60	14.12.2018	Café in Cali City	1h	R, CD

P: Procedure
R: Record
T: Transcript
CD: Content description

Table 1b. Other activities undertook during fieldwork

Case study 1) Municipal Reserve for the Sustainable Use of the Meléndez River (RSUM)	
Type of activity	**Venue, date, and organizer of meeting with short description**
Group discussion	Eco-Park *Las Garzas* . 01.12.2018. Self-arranged meeting with current members of *Apromelendez.*
Participatory observation	Eco-Park *Las Garzas* . 01.12.2018. Protected Areas Festival hosted by Cali's Environmental Authority,
Excursion	Comuna 18 and Corregimento 'La Buitrera'. 29.11.2018. Excursion to the low and medium basin of Melendez River.
Excursion	Corregimiento 'Villacarmelo'. 15.01.2018. Visit to the Mountain Market (*Mercado de la Montaña*), a community initiative promoting sustainable development in Villacarmelo, upper basin of the Melendez River. This organization offers organic products as well as services e.g. trekking, eco-tourism, yoga classes, etc.
Case study 2) El Cortijo Wetland	
Type of activity	**Venue, date, and organizer of meeting with short description**
Group discussion	Comuna 17, Residencial Unit *Terrabella* . 06.12.2018. Current group of leaders.
Participatory observation	Comuna 17, The Resistance Tent. 06.12.2018. This activity was hosted by activists of El Cortijo Wetland and the Animal Liberation Federation, a non-profit organization. This mobilization was called 'Light a candle for the *cañero* fox'. A candlethon (or *Velatón*) in defense of the threaten fauna linked to El Cortijo Wetland and *El Zanjón del Burro* natural area.
Excursion	Corregimiento 'El Hormiguero'. 02.12.2018. Visit to the plot where El Cortijo Wetland is located.
Further place-based struggles in Cali to protect urban nature (El Zanjón del Burro and La Babilla Wetland)	
Type of activity	**Venue, date, and organizer of meeting with short description**
Excursion	Comuna 22. 10.12.2018. Visit to *El Zanjón del Burro* area.
Understanding Cali's ecological context	
Type of activity	**Venue, date, and organizer of meeting with short description**
Excursion	Corregimiento 'El Hormiguero' and The Cauca River. 08.12.2018. Ceremony along El Cauca River led by the Afro-Pastoral Council of Corregimiento 'El Hormiguero'. This excursion was arranged by the researcher and a representative of the Planning Department of Cali, who works with communities in the rural lands of Cali. The purpose of this excursion was to visualize the relation between El Cortijo Wetland with further water bodies located in 'El Hormiguero' e.g. Morgan or *El Estero,* as well as to witness a highly important religious ceremony embedded in the afro community of this area.

ANNEX 2. Graphical summary in Spanish

EL CARÁCTER SOCIAL DE LA NATURALEZA URBANA: UN ESTUDIO CUALITATIVO QUE VINCULA LA ARTICULACIÓN DE VALOR Y LAS GEOGRAFÍAS EN DISPUTA EN SANTIAGO DE CALI, COLOMBIA

Palabras clave: servicios ecosistémicos, justicia ambiental, complejidad ecológica, narrativas de protección

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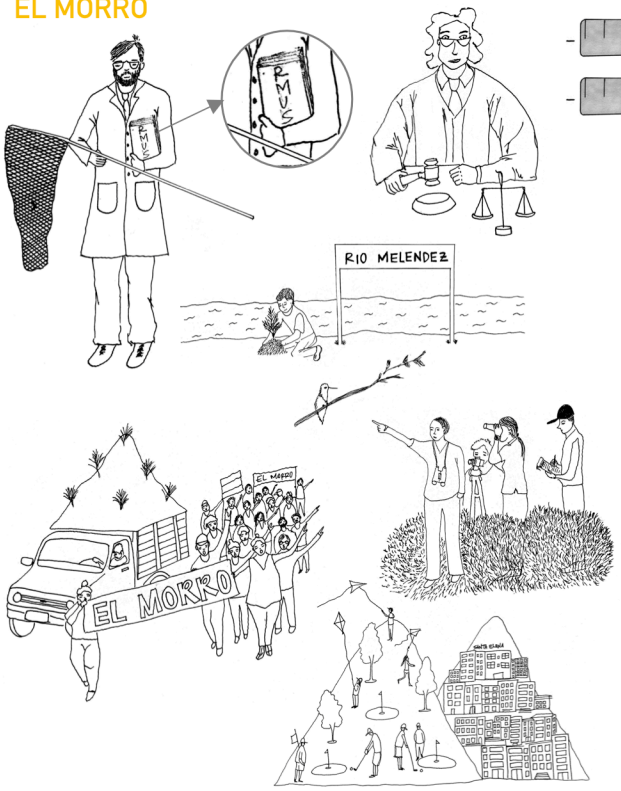
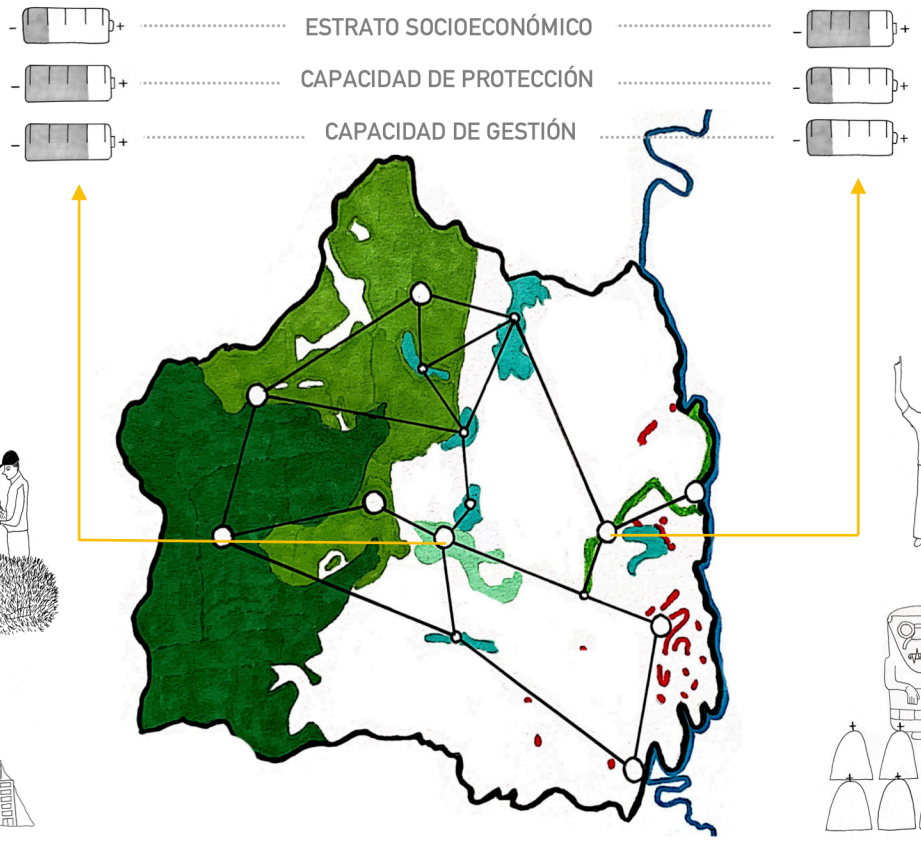
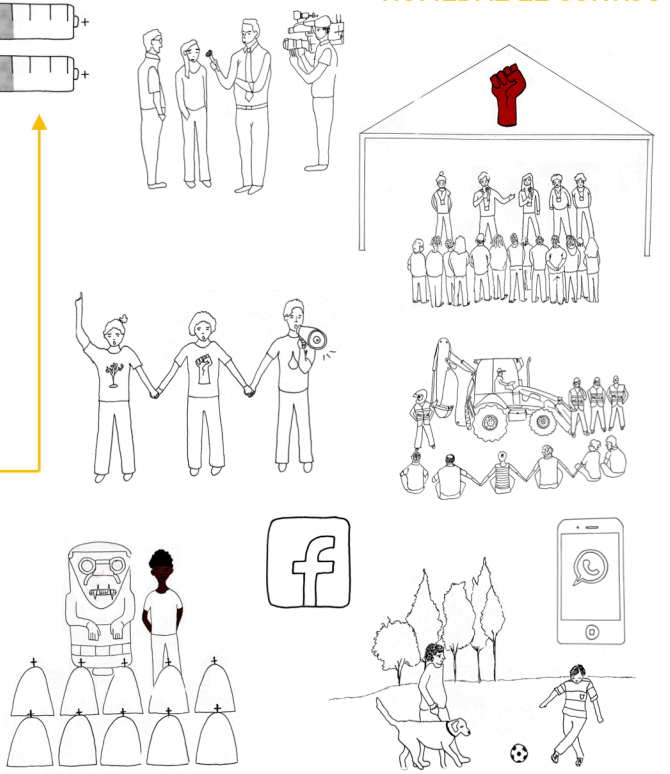
RESUMEN GRÁFICO

CASO 1: LA RMUS Y EL MORRO





CASO 2: HUMEDAL EL CORTIJO



PRIMER MODO DE ANÁLISIS

PROCESOS DE ARTICULACIÓN DE VALOR CON ARTEFACTOS Y ARENAS SOCIALES

Según esta investigación, la articulación de valor es un proceso social mediado por relaciones de poder. Los actores que cuentan con más capital (social, económico, politico,etc.) tienen una mayor capacidad para legitimar sus narrativas de protección, ya que tienen más posibilidades para mobilizar artefactos y arenas sociales. Una hipótesis que se deriva de esta idea es que los *nodos* con mayor capacidad de protección y capacidad de gestión podrán permanecer y superar las presiones de explotación. Dicha hipótesis no se cumple a cabalidad en esta investigación.

SEGUNDO MODO DE ANÁLISIS

LA CIUDAD COMO UNA RED ECOLÓGICA, COMPUESTA DE NODOS Y VÍNCULOS

Cada nodo de la red tiene cierto nivel de capacidad de protección y capacidad de gestión. Lo que ocurre en un *nodo*, no solo afecta los procesos ecológicos locales, también impacta la generación y distribución de servicios ecosistémicos a nivel de ciudad. Dicho esto, la idea de que los servicios ecosistémicos son "cajas negras" que se distribuyen homogéneamente en la ciudad es limitada, pues ignora la complejidad de los procesos ecológicos y de las relaciones de poder.