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Reparation ecology and climate risk in Latin-America: Experiences from four countries

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IPCC's Sixth Assessment is a landmark in recognizing social justice and local knowledge as imperative for successful climate adaptation; however, taking this new scientific consensus seriously has profound implications. While narratives of fossil fuel companies and closing climate windows often dominate climate politics, there is an urgent need for new thinking frames, especially given that everyday adaptations by the most vulnerable are often hindered by incumbent actors at more local scales. In response, this paper tackles the issue of climate risk and human wellbeing in Latin America from an emerging and innovative perspective: reparation ecology. Reparation is a heuristic category by means of which we systematize converging evidence about the responses of local Latin-American communities to severe socio-environmental crises that are closely connected to climate risks and to long-lasting threats to the wellbeing of human societies and ecosystems. The results focus on a comparative analysis of five case studies on nature-based urban adaptation in two low-income settlements in Brazil; local ecological governance led by actors from the organized civil society in Colombia; agroecological and just innovative food production systems in Ecuador and sustainable urban-rural food markets in Guatemala. Assuming the complexity of climate change from a culturally and geographically located perspective, the paper unveils the non-doomed, ecologically reparative character of these initiatives. It therefore contributes to the recent turn in the debate on climate risk, claiming that diverse groups of people and communities around the world are contributing to radical change, tuning their behaviors and social arrangements in what an emerging scholarship defines as reparation ecology.

KEYWORDS

reparation ecologies, climate risk, resistance, Latin-America, Brazil, Colombia, Ecuador, Guatemala

Reparation Ecology is far more than an environmental politics plus racial and gender justice. It is a rethinking of what nature, humanity, and justice means.

-Jason W. Moore, <https://edgeeffects.net/jason-w-moore/>.

Introduction

In the wake of IPCC's Sixth Assessment Report (AR6), humanity stands before a formidable challenge to “solve” the climate crisis while finding new ways to account for and learn from its complexities. Released in March 2022, AR6 advances our knowledge since the previous assessment on the already ongoing and expected future climate impacts that threaten human lives and wellbeing (IPCC, 2022). More momentous, however, is the report's recognition of the evidence, resulting from decades of critical adaptation work, that past and ongoing development trajectories, colonial histories, resource extraction and governance shape vulnerability and adaptive capacity with *high confidence* (Göbel, 2014; Aldunce Ide et al., 2020).¹ Taking this new consensus seriously has profound implications for both science and politics. Local and everyday adaptations that, in line with AR6, are produced by or with the very groups labeled as the most “vulnerable” are often under attack by local-urban developers, financial institutions, land grabbing and unhelpful urban and environmental legislation (Feola et al., 2021). Meanwhile, we observe that mainstream attempts to politicize the climate issue through the rhetoric of climate deadlines, doomsday narratives, and extinction, following the logic of climate *mitigation* (the urgent need to reduce emissions, such as the burning of fossil fuels), are at best not helpful, and in some cases harmful for adaptation. First, catastrophic narratives do not help psychologically—nor do they help politically (O'Neill and Nicholson-Cole, 2009; Hulme, 2020). Simply “uniting behind” or “passing on the words of” science is not enough, since the notions of risk and adaptation are inherently normative (premised on what is valued, and by whom, in specific locations). Second, there is increasing recognition that such narratives of “debilitating catastrophism” (Barnett et al., 2020, p. 1175) even aid further extraction and exploitation. In line with Western science that has often focused on negative social issues and pathologized the “researched”, such rhetoric paints vulnerable populations as powerless, protagonists only of catastrophic narratives, in which it is “too late” to deal with structural aspects, thus motivating a range of neoliberal solutions prescribed onto them (Barnett, 2020). Climate doomerism also neglects that diverse groups

¹ This has long been observed in Latin America, where pioneer works in Spanish and Portuguese have discussed adaptation through a critical lens (Lampis, 2013; Postigo et al., 2013; Magrin, 2015; Samaniego and Heloisa, 2015; Carrión and Acosta, 2020).

of people worldwide are quite prepared to embrace (radical) changes to their behaviors and social arrangements (Hulme, 2020). This calls for new research into climate adaptation that contemplates recent insights from the “affective turn” in the humanities and social sciences, such as on the interplay between meaning and politics of place (van Neste and Martin, 2018).

In light of this, we turn our interest to an emerging debate in environmental justice circles centered around the concept of *reparation*. Examples include *reparation ecology* (Patel et al., 2018), *ecology of repair* (Blanco-Wells, 2021), and *ecological reparation* (Papadopoulos et al., 2022) (hereafter we use reparation ecology as an umbrella term, while noting that there is not yet any agreement on what its goals and functioning should be). The central idea is that severe socio-environmental crises, caused by the intensification of industrial activity on a global scale, are conducive to new socio-material configurations and affective dispositions. In fact, by prompting the reorganization of resistance, remediation, and mutual care practices, such crises function as “ontological openings” (Blanco-Wells, 2021) for generating reparative and transformative processes from damaged ecosystems and communities. In our reading, reparation ecology goes beyond technocratic ideas of “climate repair” through geoengineering (see McLaren, 2018), disaster recovery or reconstruction and the related devices of “building back better” and “resilient repair” (DEFRA, 2019), and transformational adaptation deployed when limits to incremental climate adaptation are met (IKates et al., 2012). The marrying of the reparation and climate risk perspectives holds special promise for the Latin American continent, where climate risk is characterized by rapid urbanization, political volatility, many vulnerable settlements in coastal, riverine, mountain and floodplain geographies, and high inequality partly arising from the historical damage wrought on Indigenous and Afro-descendant people. Such damage has long-lasting effects and cannot easily be repaired—certainly not unless environmental justice is placed at the forefront of all plans to tackle climate change (Hulme, 2020).

On this basis, this paper assumes the novel perspective of reparation ecology in search of inspirational initiatives to overcome the deadlock of dooming predictions about a collapsing climate and a dying world. In particular, we adopt a converging case study approach across five Latin American cases where climate risk and human wellbeing intersect: community-based management of ecologically strategic urban areas (Brazil: São Paulo), nature-based practices in low-income Afro-Brazilian settlements (Brazil: Rio de Janeiro), sustainable management of forests by fishers, NGOs and the organized civil society (Colombia), sustainable urban food production among (mostly) Indigenous women (Ecuador), and the search for just urban-rural relations in food production and markets (Guatemala). We pose the questions:

1. What is broken/to be repaired, what are modes and mechanisms of repair, who repairs, and on what scale?
2. What is the contribution of local initiatives of ecological reparation to climate risk and human wellbeing in Latin America?

The rest of the paper is organized as follows. In the ensuing conceptual section, we review the incipient literature on reparation ecology to identify key analytical dimensions for our work (Section Emergence and scope of reparation ecology debates), and briefly outline the research and policy landscape at the intersection of climate risk and wellbeing in Latin America (Section Climate risk and wellbeing in Latin America). Next, we present our Methodology (Section Materials and methods) and the Analysis of the five case studies (Section Results: Analysis of the case studies). Finally, we critically discuss emerging cross-case trends and patterns (Section Comparison: What does contrasting the five cases tell us?) and reflect on the usefulness of a reparation perspective in a climate risk and wellbeing context (Section Reflections on reparation ecology: Do we really need a new term?), before presenting our Conclusions (Section Conclusions).

Conceptualizing reparation ecology

Emergence and scope of reparation ecology debates

An emerging discussion in climate justice, environmental sociology and history, and related fields has interchangeably been termed *reparation ecology* (Patel et al., 2018; Cadieux et al., 2019), *ecology of repair* (Thomas, 2020; Blanco-Wells, 2021), and *ecological reparation* (Sharife and Bond, 2013; Currie-Mueller, 2018; Papadopoulos et al., 2022).² Although nominally different, we contend that all these approaches share the core concern of (re)articulating notions of nature, society and justice.

The term *reparation ecology* was introduced in 2017 by environmental historian James W. Moore and justice writer Raj Patel (Patel and Moore, 2017) as a “vision” or a “program”, crediting intellectual inspiration to the Movement of Black Lives in the US (Ritchie and Stahly-Butts, 2019) and the concept of liberation ecology (Peet and Watts, 2002). Reparation ecology posits that the environment cannot be considered separately from gender, race, class, and colonialism (Empinotti et al., 2021). Accordingly, we should try to understand capitalism as an

“ecology” with a planetary reach, that involves capital, power and nature:

Weighing the injustices of centuries of exploitation can resacralize human relations within the web of life. Redistributing care, land, and work so that everyone has a chance to contribute to the improvement of their lives and to that of the ecology around them can undo the violence of abstraction that capitalism makes us perform every day. We term this vision “reparation ecology” and offer it as a way to see history as well as the future, a practice and the commitment to equality and reimagined relations for humans in the web of life. (Patel and Moore, 2017, p. 50, emphasis added).

On this basis, reparation ecology contains an aspirational objective, that is, the liberation from multi-layered forms of oppression exerted by the dominant neoliberal model that relies on the production and reproduction of crises in order to keep afloat (Harvey, 2004; Kivimaa and Kern, 2016). The term was quickly picked up by scholars: for instance in Agroecology, focusing on the self-determination and self-sufficiency of Black and Indigenous people in relation to food, land, and labor, and the reconciliation and reparation of relationships (Cadieux et al., 2019; Borrás, 2020; Montenegro de Wit, 2021).

Second, under the term *ecologies of repair*, Blanco-Wells (2021) expands on the post-humanist, philosophical and methodological dimension of reparation ecology as a “heuristic”. He builds on the rejection of society-nature dualism and the notions of assemblages from the work of Moore (2017) and others, such as de la Bellacasa (2017). To Blanco-Wells, “reparation is understood broadly as a set of open-ended actions, practices, and modes of amendment of *what is seen or felt as broken*.” (2021, p. 2, emphasis added).

A third perspective is represented by Papadopoulos et al. (2022) (as *ecological reparation*³). They turn the focus from traditional social movements who protest established institutions, toward everyday and “do-it-yourself” forms of resistance, formulated as “minor acts of care and repair”, or “practice-based community projects aimed at directly modifying the socio-ecological conditions of life in intersected ways beyond a designated issue or affected group” (Papadopoulos et al., 2022). These actions aim at *directly* repairing ecosystems and biodiversity that have been degraded or destroyed, albeit with a political dimension of reclaiming places and practices. It is a form of everyday resistance (Scott, 1989; Brink et al., 2022)

² Besides the two books cited (Patel et al., 2018; Papadopoulos et al., 2022), a Scopus search of peer-reviewed publications on 2022-02-07 using the search string “ecolog* of repair” OR “reparation ecolog*” OR “ecological reparation” found only 5 hits (Sharife and Bond, 2013; Currie-Mueller, 2018; Cadieux et al., 2019; Thomas, 2020; Blanco-Wells, 2021). Corresponding searches in Spanish, Portuguese and French had no hits.

³ Two additional studies using the term “ecological reparation” focus more narrowly on responsibility, liability, restoration, and compensation in the context of an oil industry railroad disaster Currie-Mueller, 2018 and climate loss and damage and other damages on “human and ecological life” Sharife and Bond, 2013.

that people may engage in alongside—or beyond—other more established socio-environmental movements and the state.

Nonetheless, reparation ecology, and the underlying reasoning (Moore, 2015, 2017; Patel and Moore, 2017), has also faced opposition. Two main critiques are that the approach (1) lacks a concrete program of action, such as divesting from fossil fuels or repairing the metabolic rift between society and nature, and (2) uses the term ecology “in ways that have no scientific content” (p. 4), that is, in a figurative way rather than referring to the study of organisms and their environment (e.g., as *world-ecology*, *capitalism’s ecology*, *modernism as an ecology*) (Angus, 2018). This raises fundamental questions about reparation ecology as a concept, what ecology refers to, and what reparation entails. We hereby put forward four key questions to interrogate the reparation ecology literature strains (which correspond to our first research objective, see Section Introduction):

1. What is broken and in need of repair?
2. Who are the agents of reparation?
3. What are the forms and mechanisms of reparation?
4. At what scale does reparation occur?

What is broken and in need of repair?

In the emerging literature on reparation ecology, “what is seen or felt as broken” (Blanco-Wells, 2021, p. 2) ranges from broken relationships, damaged ecosystems, and obsolete institutions to constructs around nature (Yakamovich, 2019). Relationships seem, however, to be in focus, especially when other aspects, such as atrocities committed during slavery or the stable state of the climate, appear beyond repair (Buck, 2019; Cadieux et al., 2019): “It is, principally, relationships that need to be repaired, not just landscapes, the atmosphere, the climate” (Aprich, 2020). Some studies emphasize the reparation of the *metabolic rift*, a Marxist term that can denote, more specifically, the rupture in nutrient cycling between town and city, or more generally, the rupture between humans and the land or humans and nature under capitalism (Schneider and McMichael, 2010; Montenegro de Wit, 2021). Damages that require reparation might also be psychological. For instance, the environmental philosopher Albrecht developed the concept of *solastagia* to understand the psychological trauma or place-based distress that people experience because of environmental change (Askland and Bunn, 2018). For the purpose of this paper, one of the most stimulating readings about “what is broken and in need of repair” comes from Latin-American environmental history, which emphasizes the historical impact of colonialism and its extractive practices on ecosystems, people and places. Palacio (2001) unravels the historical thread of the enormous biodiversity loss that Colombia suffered between the sixteenth to the twentieth century, including how the transformation and exploitation of landscape and resources revert in daily details, such as the scarcity of certain products on the main popular

markets in the squares of Bogotá. Of relevance to the budding field of reparation ecology, Latin-American environmental history has a distinctive methodological approach in which the notion of loss embraces a unity of meaning made up by culture, territory, the local economy and traditions, and the rights of the people (Gallini, 2009).

Who are the agents of reparation? (Who should be in charge of repairs?)

At the heart of the idea of reparation ecology is *resistance from below* from Indigenous, Black, and women’s groups, climate activists and labor unions (Patel and Moore, 2017). In other words, such groups are not merely victims but agents, and they are increasingly connected: Patel and Moore (2017) call the emerging horizontal alliances between such movements “an antidote against pessimism” (p. 49). To Papadopoulos et al. (2022), reparation “redirects attention from more visible players [...] toward those typically absent or silenced [such as] rural laborers, Indigenous communities, urban activists, grassroots infrastructure maintainers, practitioners of ecological transitions in the global North and South, but also inorganic actors, natural elements, animals, the dead, spirits, objects, and landscapes” (p. 3–4).

What are the forms and mechanisms of reparation?

Reparation implies an underlying ethics of care and responsibility, rather than just “patching up what has been damaged”; such practices “encourage novel alliances, sensitivities, affectivities, intimacies, and material relations” (Papadopoulos et al., 2022, p. 4). Reparatory processes may take the form of “novel organizational arrangements, as new forms of inter or multi-species interaction, as forms of reconciliation between production, self-reliance, and consumption, as preservation and restoration actions, as forms of healing and self-care, as expressions of artistic creation” (Blanco-Wells, 2021, p. 7). Patel and Moore (2017), departing from a critical view of both society and its view of nature (e.g., as pristine, untouched, that can be “damaged” and then “restored”), outline a historically-informed program for reparation based on 5 R’s: recognition, reparation, redistribution, reimagination, and recreation. In the case of patriarchy, for instance, they imagine that the redistribution of domestic work is a central part of reparation, but that this cannot be considered separately from the energy needed to warm or cool homes, or food regimes for healthy diets.

At what scale does reparation occur? (What is the appropriate unit of analysis?)

While agency and protagonism of grassroots is central to the literature on reparation, there also is a relational aspect present.

Reparation suggests a debt or obligation (Sharife and Bond, 2013): for instance, an ecological debt that is owed, be it to living people, or more-than-human subjects such as other organisms, rocks, spirits, ancestors or future generations (Sharife and Bond, 2013; Blanco-Wells, 2021). In line with this, reparations and compensations might be owed from governments, corporations, or the international community. In addition, systemic change often requires engagements beyond the local level. For instance, granting reparation to Black Americans through improved access to healthcare could mean recommodifying healthcare (Patel and Moore, 2017). Similarly, in the case of multinational corporations responsible for major environmental disasters and supporting dictatorships, reparation could include putting an end to the tax havens that sustain them (Sharife and Bond, 2013). This is not without challenges, especially since states often have conflicting roles as both perpetrators and enforcers of rights (Sharife and Bond, 2013).

Based on our reading of the emerging literature, we tentatively suggest four key dimensions of reparation ecology (see Figure 1):

- Reparation as **biocultural engagement** (direct repair of ecosystems or relationships by people-in-places, organisms, etc.).
- Reparation as **resistance** (from territorialised struggles, movements, or assemblages against governments, corporations, narratives, etc.).
- Reparation as **compensation** (from governments, corporations, international community etc. to human or more-than-human agents).
- Reparation as **reframing nature** (from communities, other cosmovisions, narratives, also *via* science and technology—which may, in turn, facilitate new forms of resistance or compensation, such as the legal rights of a river).

Climate risk and wellbeing in Latin America

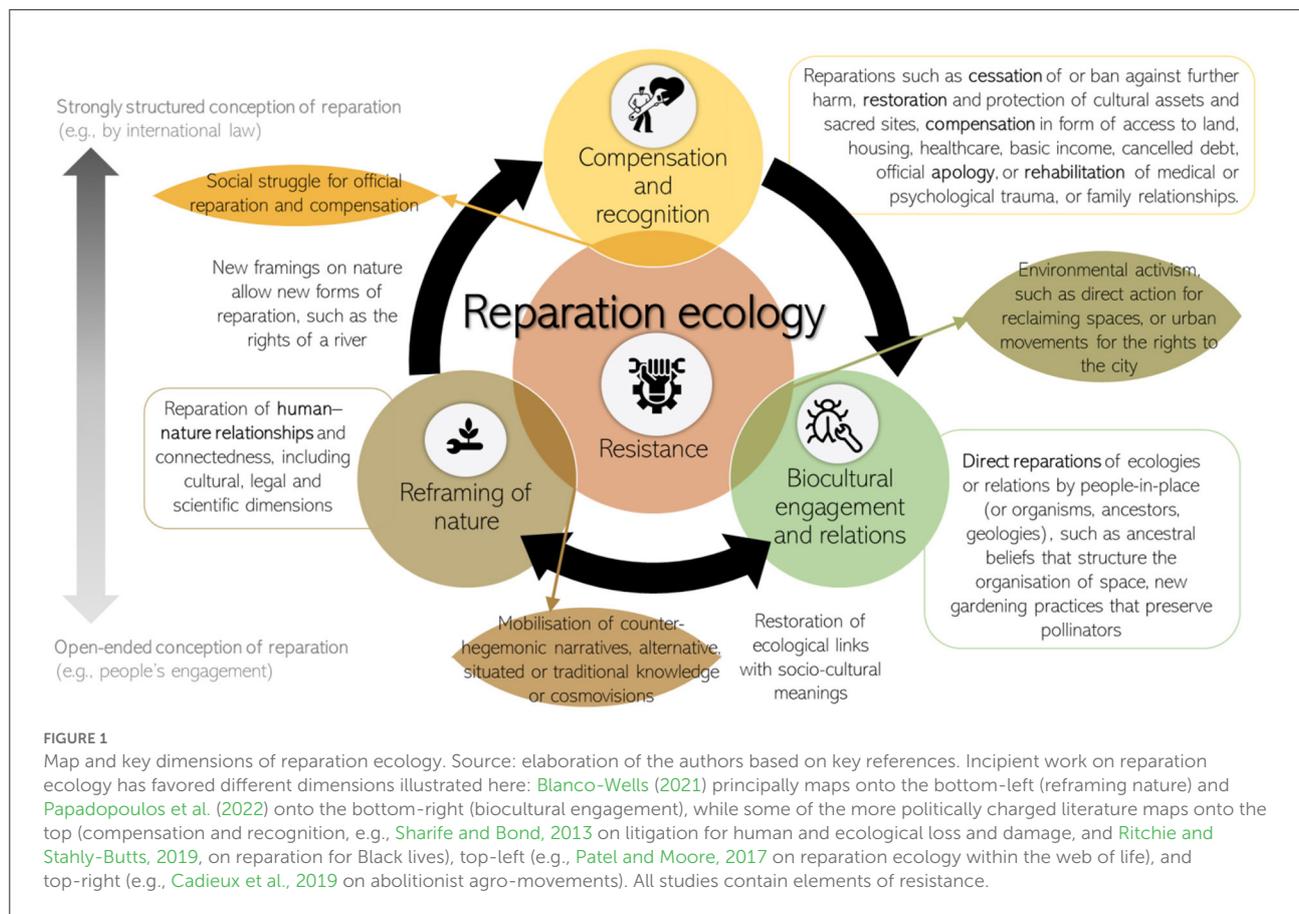
Our case studies are located in distinct climatic zones and regions which, according to the recent AR6, present specific critical trends and scenarios that have major implications in terms of climate risk and human wellbeing.

- The Rio de Janeiro and São Paulo cases (Brazil) are located in South-eastern South America (SESA), where increases in mean and extreme precipitation are observed since the 1960s (*high confidence*). Drivers of this change include internal variability as well as internal forcing, like increases in greenhouse gases and aerosols and ozone depletion. The intensity and frequency of extreme precipitation and pluvial floods are projected to increase (*medium confidence*) for 2°C of global warming level or above.

- The Bogotá (Colombia) and Quito (Ecuador) cases are located in North-western South America (NWSA), where decreases in snow and ice, and increases in pluvial/river flooding are projected with high confidence. Glacier volume loss and permafrost thawing will likely continue in the Andes Cordillera under all greenhouse emissions scenarios presented in AR6, causing important reductions in river flow and potentially high-magnitude glacial lake outburst floods.
- The Guatemala case, comprising the regions of Chiquimula and Guatemala City, are in the Southern Central America (SCA), where the aridity of the Dry Corridor, and agricultural and ecological drought are increasing (*medium confidence*). Fire weather is projected to increase (*medium confidence*).

However, climate risk in Latin America is also largely shaped by societal factors, such as rapid urbanization and political and economic volatility, which gives rise to vulnerable populations and unprotected settlements in hazardous locations. This includes a complex and multi-layered dynamic in which neo-colonial policies and market strategies interact with limited democracies (Lautier, 2010; Allegretti et al., 2013) and unruly violation of human and social rights, particularly so in rural and paramilitary conflict-prone areas (Pérez-Rincón, 2014) and urban peripheries (de Feltran, 2010; Moreira Accioly et al., 2020). Such development has always implied significant biases and harsher penalizations against women, Indigenous groups, afro-descendants (Iles, 2019) and other social minorities and identities. The deforestation of the Amazonia, often depicted by national and international media, is but the tip of the iceberg of a far more dramatic scenario in the region of environmental degradation, dismantling of environmental and social protection, and violent pursuit of environmental and social activists (Brandão et al., 2018; Lampis et al., 2020).

Common solutions to adaptation are further hindered by limitations in the sphere of public policy, where climate change deliberation takes place in “hiding”, that is “behind terms such as sustainable development and green economy” (Campello Torres et al., 2019, p. 33; Giulio et al., 2019). Similarly, local adaptation is often reduced or “retrofitted” to hegemonic international and national policy frameworks or concepts, which has produced the delegitimization of many local, regional and urban policies (Fuchs, 2011; Vercellone and Cardoso, 2017). The adoption of nature-based solutions, such as urban agriculture, river restoration and hybrid (green-gray) infrastructure is still incipient in all the regions according to chapter 12 “Central and South America” of the AR6 (IPCC, 2022; Pires et al., 2022). However, it is often framed as a cost-effective solution for an urgent scenario. For instance, Latin America and the Caribbean suffered losses of 1 billion dollars caused by damage in 12 floods that occurred between 2000 and 2019 according to a recent major report (OCHA, 2020).



Materials and methods

The complexity of climate change requires culturally and geographically situated perspectives ([Haraway, 1988](#); [Nightingale, 2016](#)). Departing from our different disciplinary perspectives in the research group, from Ecology and Economics (traditional hypothesis-driven quantitative studies), to ethnographic, archival and activism-based research conducted within Sociology, Geography and Sustainability Science, we try to break through historically constructed and epistemologically supported differences to reach out toward the proposal of new innovative methods for better research on the multi-layered dimensions of climate change.

Methodologically, we use a converging case study approach, where the research questions guided the analysis of the five selected cases. The cases are connected by their empirical relevance in terms of ecological reparation as they either contribute to alleviating climate risks and enhancing human wellbeing. Although the specific object and the empirical evidence from each case study are country-specific, the methodology is geared at the production of comparable results through adopting a similar research design:

- A country-specific review of policies at the intersection of climate risk and human wellbeing and the local published and gray literature (informing Sections Climate risk and wellbeing in Latin America and Results: Analysis of the case studies);
- The analysis of the most relevant experiences from each case study (informing Section Results: Analysis of the case studies, and listed in [Table 1](#) below), and
- A cross-cutting comparative analysis on the basis of emerging themes from the qualitative analysis of the collected materials (informing Section Comparison: What does contrasting the five cases tell us?).

The research process took an inductive and iterative format, where analytical categories (the four prompting sub-research questions and the four dimensions of reparation ecology) were created through several rounds of literature review on reparation ecology, applying the tentative categories to the cases, and “reading the cases through each other” ([Barad, 2010](#); [Woroniecki et al., 2020](#)) to generate reflexive discussion and critique of the categories within the team and to offset potential blind spots in the analysis of individual cases. The methods and

TABLE 1 Overview of the methodological approach for the case studies.

Case	Period of study/engagement	Methods of data collection and analysis	Reference to key literature and authors' work published elsewhere
1. Low-income community in São Paulo's eastern periphery, Brazil	2020–2022	<ul style="list-style-type: none"> Participant observation, transects, work with the community, open-ended interviews and observational field notes over a 3-month period Ethnography of space and place. Institutional gray literature and review of peer-reviewed literature 	<ul style="list-style-type: none"> Low, 2017 Emerson et al., 2011 Lampis, 2022
2. Afro-Brazilian communities (Quilombos) in Rio de Janeiro, Brazil	2014–2022	<ul style="list-style-type: none"> Participant observation and informal interviews with communities, conservation agencies and courts; Review of literature and historical documents. Thematic analysis based on academic and legal concepts Researcher-activist stance: Author's long-term support of and legal counsel to the community 	<ul style="list-style-type: none"> Santos, 2018; Santos and Brink, 2022
3. Fishermen in Tamalameque Cesár, Colombia	2022	<ul style="list-style-type: none"> In-depth interview with community leaders, review of documents 	<ul style="list-style-type: none"> IDEAM, 2015
4. Urban Agroecological food production in Ecuador	2019–2020	<ul style="list-style-type: none"> Systematic review of the literature in English and Spanish using academic search engines with strings with endings and variants of the words: "food system", "climate change", "sustainability", "urban agriculture", "Quito". For the classification of the information, we use the PRISMA statement: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (preferred reporting items for systematic reviews and meta-analyses). We validate the resulting categories through a DELPHI-style panel of experts. Interviews. 	<ul style="list-style-type: none"> Carrasco-Torrontegui and Cardenas, 2021 Carrasco-Torrontegui, 2020 Cárdenas Galarza, 2020
5. Food markets in Guatemala	2021–2022	<ul style="list-style-type: none"> Literature review in English and Spanish in peer-reviewed journals and "gray" publications on rural-urban relationships, smallholder farmers and fair-trade markets Own research experience on forest regeneration and community participation in growing of native staple crops and management of natural resources in the Ch'orti' region. Interview with a local leader and member of the farmers' association (known as ASPACH) and consultations with local inhabitants in the Central American Dry Corridor. 	<ul style="list-style-type: none"> Boudet et al., 2020 Lynch, 2005 Johnson, 2006 Hernández et al., 2012a Hernández et al., 2012b

tools deployed in the individual case studies are summarized in [Table 1](#).

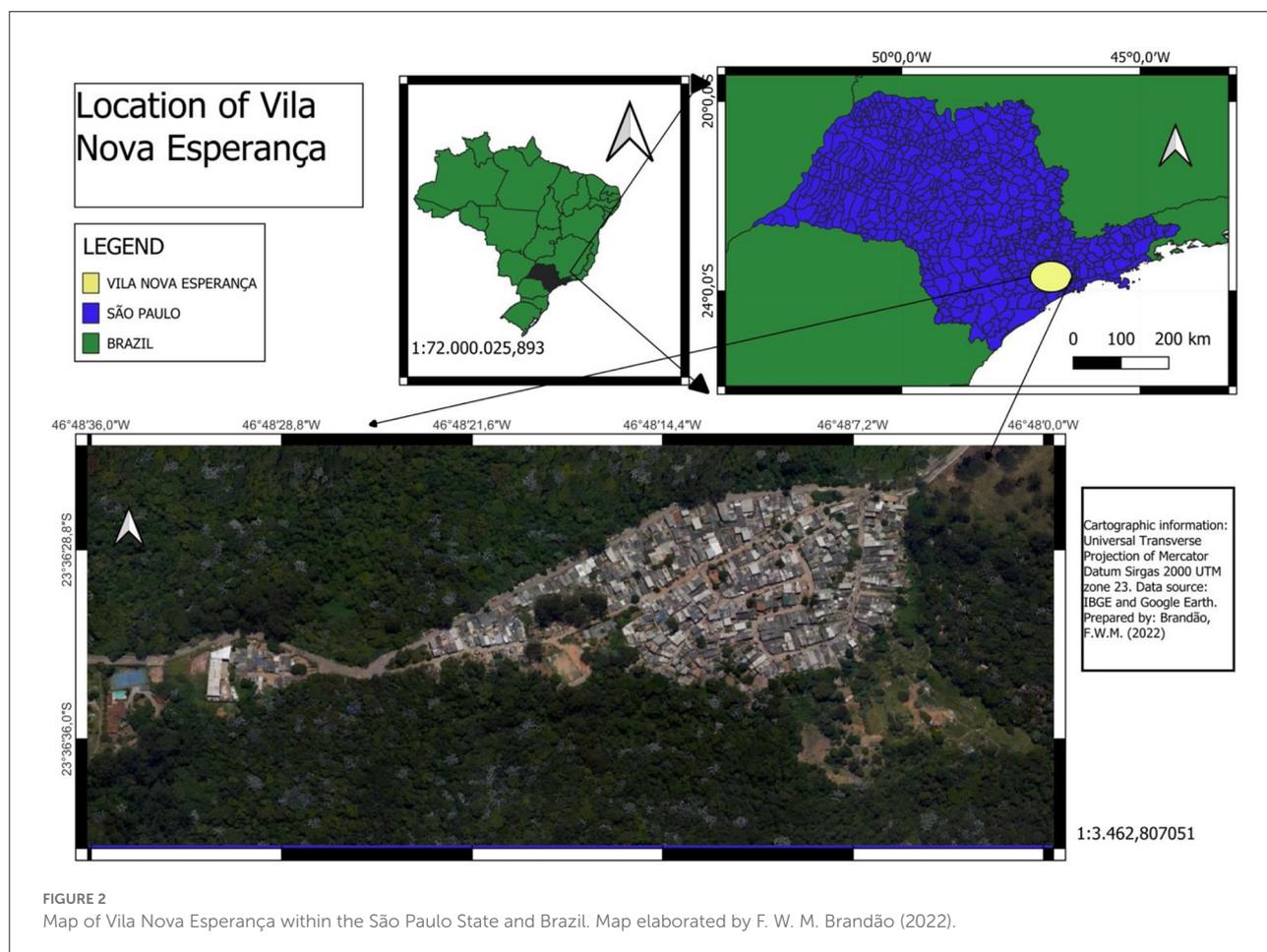
Results: Analysis of the case studies

This section presents the analysis of the five cases, to answer the research question on how these local initiatives, connected and analyzed through the lens of reparation ecology, contribute to the joint goals of climate resilience and human wellbeing.

Reparation and sustainability: Vila Nova Esperança (São Paulo, Brazil)

What is broken and in need of repair?

This case concerns the community of *Vila Nova Esperança*, located on the outskirts of the *Jequitibá Park*, close to the border that separates the municipality of São Paulo (Brazil) from its neighboring municipalities Taboão da Serra and Osasco. Vila Nova Esperança (the Vila, for shorthand) has long been at the forefront of a harsh socio-environmental conflict. The area occupied by the community ([Figure 2](#)) has multiple owners,



among which the Basic Sanitation Company of the State of São Paulo (SABESP) and the Housing and Urban Development Company of the State of São Paulo (CDHU) stand out. In addition, an essential fact is that the village is located inside a preservation area, *Jequitibá Park* (former *TIZO Park*), an important remnant of Atlantic Forest in the middle of the urban area, between São Paulo and Cotia⁴ (SIMA, 2019). As early as 2006, the Vila underwent a judicial process for the removal of the households occupying the land accused by the authorities and environmentalist association of being not only illegal land occupiers, but an environmental threat to the park.

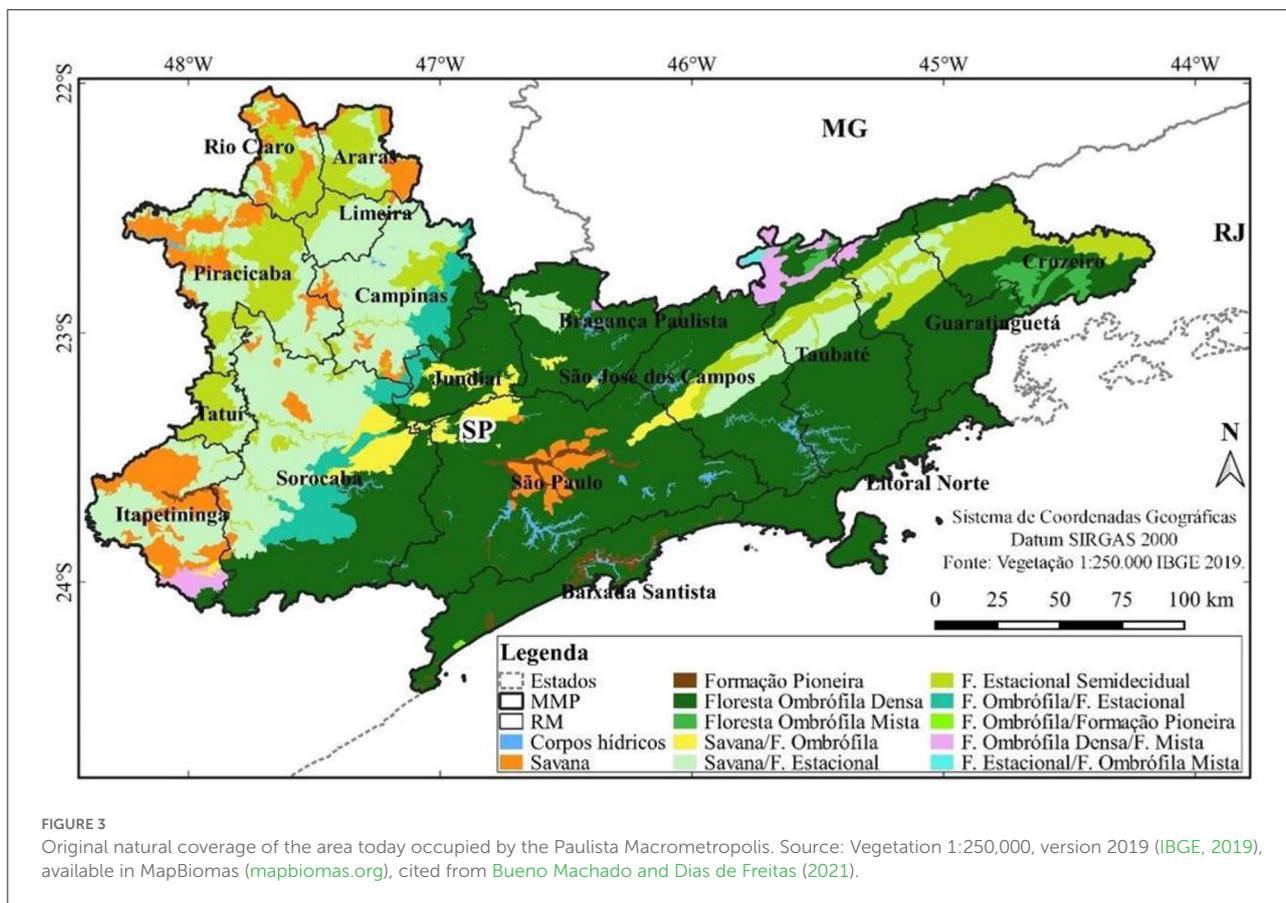
The city of São Paulo was one of the first western metropolises to industrialize and densify, as early as in 1920 (Pompeu de Toledo, 2015). The expansion of Metropolitan São Paulo in the last century unleashed a set of dynamics centered on intensive patterns of land, energy, and material consumption (Campello Torres et al., 2019). This produced lasting impacts that we only nowadays can fully appreciate in terms of climate risk magnification and implications for human

wellbeing (Lampis et al., 2020). The high vulnerability to the impact of extremes, such as rainfall events, is accredited to social, economic, and demographic factors, lack of access to urban infrastructure, water and sanitation (Meida et al., 2017), as well as to the loss of natural coverage in the city's urbanization process (cf. Figures 3, 4) (Bueno Machado and Dias de Freitas, 2021).

Who are the agents of reparation?

The socio-environmental struggle of the Vila Nova Esperança local foundation is spearheaded by Lia Esperança. With emphasis in the 2010s, hence in a pre-pandemic scenario, she gained the confidence of fellow residents and won an election to become the community leader. A small group of close followers helped to set up several strategic projects, beginning with the reorganization of waste collection, disposal, and recycling. Between 2010 and 2014, with the support and networking of NGOs and universities, the initiatives of the newly founded Organization Vila Nova Esperança grew to include an organic garden of approximately 1 ha. The garden produces food for sale on local markets, generating income

⁴ A municipality on the Eastern outskirts of São Paulo.



that is also spent to support the most vulnerable members of the community, and guarantees basic food security for those working in the organization, a floating group of some 30–50 people in those thriving years. Through these efforts, the community managed to revert the perception of key environmental institutions and gained legitimacy within the public opinion and the local press. In 2014, the environmental activism of what had become a twin organization (the Vila Nova Esperança Organization at the popular level and the Vila Nova Esperança Foundation managed by Lia Esperança) received the Milton Santos prize for work related to the Consolidation of Territorial and Social Rights.

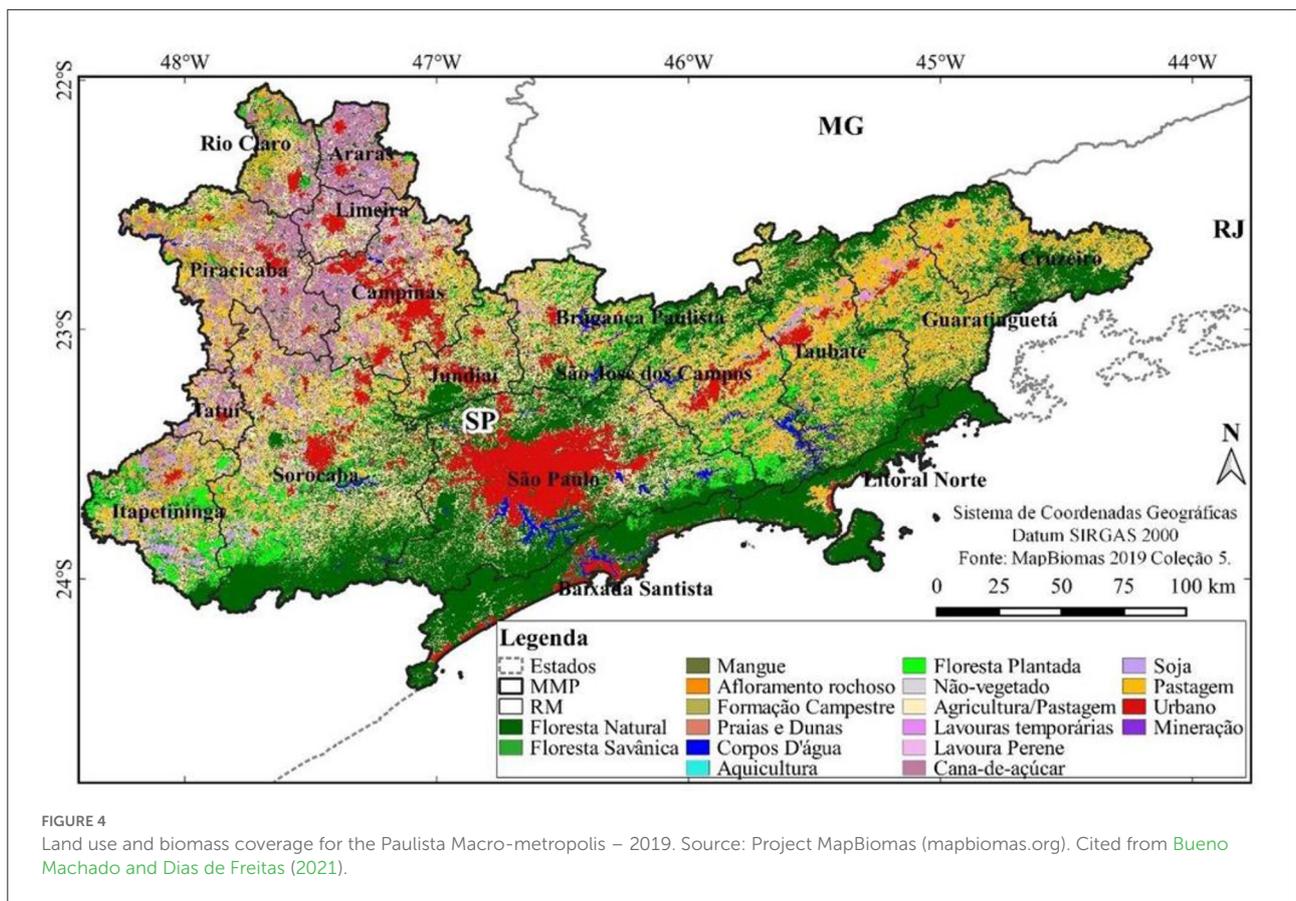
What are the forms and mechanisms of reparation?

While beginning by a simple intuition—the need to clean the garbage from the Vila to show that its residents could look after the environmental dimensions of their community—the initiative grew to include organic garden, a communal kitchen catering to the members of the foundation and the community at large, and educational programs for children. Nowadays, Vila Nova Esperança contributes to

the mitigation of climate risks in São Paulo through their work of stewardship of the *Jequitibá* park, thus helping to reduce climate risk. This has led the local water company (SABESP) to agree in 2015 to allow them to occupy the land without further proceeding in the actions aimed at forced removal. However, the economic crisis and the COVID-19 pandemic have challenged the continuity of some of the initiatives.

At what scale does reparation occur?

In this experience, it would be hard to disentangle the perspective of reparation as *biocultural engagement*, from that of *resistance* (see Table 2). In Vila Nova Esperança, sustainability is the articulating category of a set of actions and strategies to legitimate the community as a socially and environmentally proactive actor, including more traditional social struggles, such as the right to stay-in-place, and access to decent housing, health, education and other public services. Around this notion, the community has produced and mobilized a powerful imaginary that connects their own struggles with the environmental and planning priorities of formal institutions and society.



Reparation and resistance: Quilombos Vargem Grande and Camorim, Rio de Janeiro

What is broken and in need of repair?

The case concerns two traditional Afro-Brazilian territories or *Quilombos*, Camorim and Vargem Grande, where climate-related hazards like slope erosion and landslides are entangled with other issues such as cultural heritage protection and value conflicts over the use of peri-urban space (Santos, 2018; Santos and Brink, 2022). *Quilombos* (*Palenques* in Spanish-speaking Latin America) were the first free territories founded by formerly enslaved Brazilians. Today, Brazil's more than 5,000 *Quilombos* are at the frontline of struggles against environmental destruction; however, the COVID-19 pandemic, and the loss of traditional knowledge resulting from the death of elders, has been particularly hard on traditional communities (Coelho-Junior et al., 2020).

Camorim and Vargem Grande are situated in the West Zone of Rio de Janeiro, adjacent to the rapidly urbanizing Jacarepaguá Lowlands, and in the buffer zone of what is now the State Park Pedra Branca (established in 1974) (see Figure 5). Conservation in the park is under multiple pressures, with environmental and

climate-related impacts such as erosion of slopes, landslides, and microclimate changes. The accelerated urbanization of Jacarepaguá, including Olympic facilities and a near-lying high-end condominium, have also negatively impacted the two *Quilombos*, especially the more urban Camorim. Construction has brought heavy vehicles, uncomfortable noise and dust, reduced mobility, and the loss of archaeological heritage sites, and the *Quilombo* residents have faced verbal threats and racism from militia, developers, and new residents.

Who are the agents of reparation?

Quilombo territories are important sites of Afro-Brazilian resistance and culture, often with elements of agroforestry and Afro-diasporic knowledge, kinship, faith, and herbs for ritual use. In 1988, 100 years after the country's abolition of slavery, their residents were given protection in the new Brazilian constitution as a traditional population. *Quilombos* are thus both a legal category for collective land ownership and a wider notion of Afro-Brazilian resistance against social-economic and cultural domination and racism. The reparative actions performed by the residents of Camorim and Vargem Grande tie in with such social justice dimensions in their struggle to

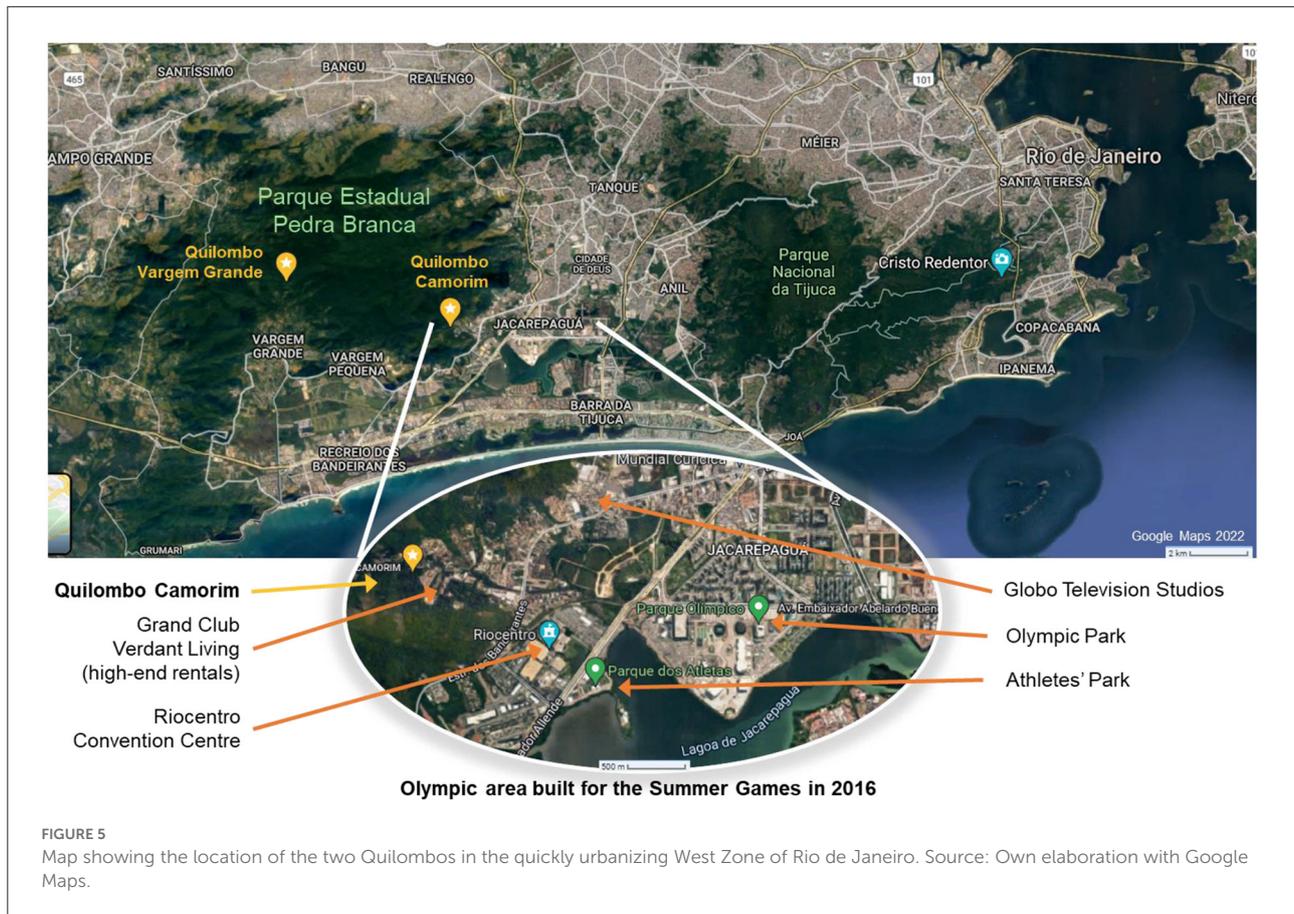
TABLE 2 Overview of the case studies according to key dimensions of reparation ecology.

Case	Reparation dimension	Climate-Risk	Vulnerability factors	What is broken/in need of repair?	Process/type/mechanism of reparation?	Scale of reparation
São Paulo	<ul style="list-style-type: none"> • Resistance • Biocultural engagement 	<ul style="list-style-type: none"> • Landslides (community level) • Droughts (ecosystem level/park) • Water scarcity (city level) 	<ul style="list-style-type: none"> • Eviction • Food insecurity • Water pollution 	<ul style="list-style-type: none"> • Threatened vital ecosystems • Water reservoirs and large urban forest for carbon sequestration) 	<ul style="list-style-type: none"> • Organizing local resistance to eviction based on environmental sustainability • Declaring the community as a key conservation player for threatened vital ecosystems • Combining community social work to improve the quality of life of households and individuals with sustainable urban food production, bioenergy production, and protection of the borders of the urban forest 	Urban illegal settlement in the periphery of a major metropolitan region
Rio de Janeiro	<ul style="list-style-type: none"> • Resistance • Biocultural engagement • Compensation • Re-framing nature 	<ul style="list-style-type: none"> • Food security, poverty (community level) • Slope erosion, landslide (ecosystem level/park) • Water scarcity (city level) 	<ul style="list-style-type: none"> • Aggressive urbanization • Gentrification, • Poverty, • Environmental racism 	<ul style="list-style-type: none"> • Damaged ecosystems, • Past and present consequences of transatlantic slavery 	<ul style="list-style-type: none"> • Agroecological lifestyle; celebrating Afro-Brazilian culture. • Environmental and anti-racist education. • Alliances with universities to document archaeological heritage • Legal resistance to claim constitutional rights 	Urban peripheral ecosystems
Tamalameque	<ul style="list-style-type: none"> • Biocultural engagement 	<ul style="list-style-type: none"> • Food security, poverty (community level) • Floods, drafts (ecosystem level) • Lower river levels with decrease capacity to dilute pollutants (regional level) 	<ul style="list-style-type: none"> • Aggressive agro-industrial expansion 	<ul style="list-style-type: none"> • Traditional livelihoods practices connecting the community with the river and the marshland ecosystem are marginalized by economic logics based on agrobusiness, paid work and use of technology 	<ul style="list-style-type: none"> • Biodiversity recuperation (fishes and birds repopulate the local waters and forests) • Successful erosion prevention • Construction of a “plant nursery” with benefits in terms of livelihoods, food security and environmental education • Better socioeconomic conditions foster social cohesion and allow for better conflict resolution, unleashing positive energies to be dedicated to communal activities in CCA 	Rural and urban ecosystems
Quito	<ul style="list-style-type: none"> • Resistance • Biocultural engagement 	<ul style="list-style-type: none"> • Anthropogenic drivers (city level) • Inadequate water management (city level) • Deforestation (ecosystem level) • Unregulated urban expansion (city level) 	<ul style="list-style-type: none"> • Extreme hydrometeorological events • Thermal stress 	<ul style="list-style-type: none"> • Technology-informed industrial food production has lost track of the implications of mass food production for the local ecosystems, while hindering ancestral ecologically sustainable and climate adapted practices 	<ul style="list-style-type: none"> • Participatory local common agriculture • Application of ancestral knowledge and techniques to seeding and planting. • Enhanced intergenerational cohesion • Improved food security and nutrition • Direct and indirect contributions to local ecosystems recovery and resilience through less CO₂ emissions 	Metropolitan and neighborhood levels

(Continued)

TABLE 2 (Continued)

Case	Reparation dimension	Climate-Risk	Vulnerability factors	What is broken/in need of repair?	Process/type/mechanism of reparation?	Scale of reparation
Guatemala City	<ul style="list-style-type: none"> • Resistance • Biocultural engagement 	<ul style="list-style-type: none"> • Use of agrochemicals in conventional agriculture (ecosystem and community level) • Semi-arid ecosystems (ecosystem level) • Recurrent extended droughts and advanced soil erosion (ecosystem level) • Extreme climate events and associated disasters (ecosystem, city and community level) • Impact of water scarcity on fragile rural livelihoods (community level) 	<ul style="list-style-type: none"> • Ethnic identity • Food insecurity • Economic and land inequality along ethnic lines 	Ch orti smallholder farmers have marginal livelihoods (e.g., agriculture diversification opportunities) to develop strong urban - rural relationships toward urban trading centers to effectively engage in just food market initiatives. Their market access opportunities are severely limited by extreme conditions of climate vulnerability, long-term food insecurity and poverty and historic land tenure inequality and socio-economic exclusion	<ul style="list-style-type: none"> • Innovative ecosystem restoration, with traditional practices inserted in new frameworks inspired to climate and environmental justice. • Partnership for sustainable development • Market and cultural heritage combined to reevaluate traditional cultural assets and agricultural practices • Solidarity markets function with minimal intermediation, placing mutual respect and beneficial social and economic relationship center stage 	Economic regions and municipalities of the Dry Corridor including its capital Chiquimula



get officially recognized as Quilombos and obtain their land titles, as well as more general urban socio-environmental repair through the multiple values (historical, religious, environmental, pedagogical, cultural, etc.) they provide for the city of Rio de Janeiro. Both Quilombos constitute archaeological sites that bear witness of the past oppression, colonial relationships, and production of social hierarchies.

What are the forms and mechanisms of reparation?

Both Quilombos perform a range of ecological and agro-ecological functions, through preserving of sacred flora and fauna, agroforestry production (mainly of banana), and monitoring of ecological risks. A local commission in Vargem Grande works to assess the risks of landslides on the trails that they used historically, and in Camorim, there is a group that inspects the trails to contain the risk of landslides or falling of old trees or trees attacked by pests. However, this empirical knowledge often collides with that of the organization managing the conservation unit (Rio de Janeiro State Environmental Institute, INEA); for instance, one of the trails abandoned and deactivated a decade ago

by Quilombo residents, due to the fragility of the slope, continues to be used by INEA agents and park-goers. The hydro-ecological function should also be highlighted, since these territories preserve the riparian forests of the springs and water bodies where the Rio de Janeiro water utility carry out essential water abstraction to meet the service demands of its West Zone.

The Quilombos have a pedagogical role in passing on traditional ecological knowledge and Quilombo identity to descendants, but also through environmental education, awareness raising, and partnerships with local public and private schools and universities. The latter bears particular significance for reparation, since the teaching of Afro-Brazilian history in schools has always been precarious, despite Federal Law 10.639/2003 created with the aim of bringing more African and Afro-Brazilian History and Culture to classrooms, and to value and emphasize the African presence in society.

This last ties in with their alliance-building and legal struggle to receive their collective land titles based on their protection in the Constitution, and to resist real-estate development in the quickly urbanizing area. Recognition of Camorim as an archaeological site of interest in 2016 was an important win, but the titling process of both Quilombos

finds itself stalled in 2022. What is at stake is not only the right to land, but also guarantee of rights linked to land—including health, education, religious exercise, security, water supply, supply of energy, and public lighting. For this purpose, Quilombo representatives stress the importance of occupying political spaces outside the territory: universities, public hearings, the municipal legislative chamber, the thematic chambers of INEA, and marches and popular demonstrations for traditional people.

At what scale does reparation occur?

All four dimensions of reparation ecology feature in and are intrinsically linked in this case. There is the aspect of *reframing nature* (see Table 2) through a sacred and ancestral perspective with deities (*orixás*) based in nature. This cosmovision guides the everyday *biocultural engagement* with the territory, such as agroforestry, preserving sacred flora and fauna, and remembering, rescuing, and commemorating historical and contemporary cultural heritage. The communal structure, improvements to the landscape, and archaeological traces of past generations are, in turn, necessary criteria for the process toward obtaining collective land titles as per the constitutional rights of Quilombo populations. This right (albeit hard to access) can be seen as an attempt toward *recognition and compensation* for harms suffered by their ancestors. Finally, the *resistance* dimension permeates life and the cosmovision of Quilombos since their inception. In sum, reparation here consists of the use value, food security, local and matriarchal protagonism, ecosystem management, education, and horizontal legislation which aim at the reconstruction of memory and relations of collective struggle and resurgence.

Actor-led local ecological governance: Climate change adaptation and the organized civil society in Tamalameque (César), Colombia

What is broken and in need of repair?

This case study of Tamalameque, Colombia, targets the relationship between climate risk and human wellbeing, particularly regarding food security, as the river is the main source of food for the local community. The effects of climate change are severely felt by local communities: seasonal weather patterns are increasingly unpredictable, whereas floods and droughts arrive at unexpected times of the year. The impact of flooded lands on human wellbeing is major as floods occur more frequently, three times per year instead of two; meanwhile, the timing of water absorption has slowed down due to the physical limits presented by a landscape largely consisting of wetlands and marshes.

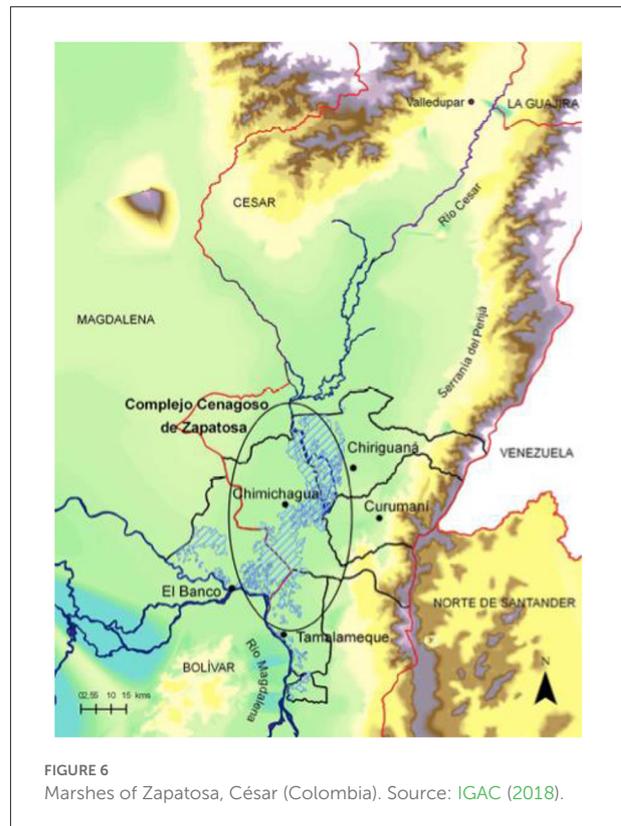


FIGURE 6
Marshes of Zapatos, César (Colombia). Source: IGAC (2018).

Tamalameque is a municipality of some 13,000 inhabitants (2015) in the department of César, northern Colombia, occupying an area of 512 m² along the Magdalena River—the country's longest and most important river in terms of fisheries and fluvial transportation (Municipios de Colombia, 2022). Located in a flood risk-prone area, at just 25 m above sea level, Tamalameque is also part of a strategic marshland complex, the *Ciénaga de Zapatos*, long-since a focal point for socio-environmental conflicts and an area of great agro-industrial expansion. The Regional District for Integrated Management of the Zapatos Swamp Complex stretches from the department of César to the Magdalena, in the Colombian Caribbean region, between the Momposina depression and the Magdalena River delta (see Figure 6). In its preliminary 2021 report focusing on ecosystem-based disaster risk reduction, the Ministry of Environment of Colombia proposed to turn the marshland of Zapatos into a protected area to preserve the ecosystem and support sustainable production systems linked to local cultural traditions (Nieto, 2021).

Colombian environmental historians have described the agro-modernization expansion that took place in the area between the 1920s and the end of the 1970s (Palacio, 2001). Agricultural modernization was introduced at the expense of more traditional livelihoods that combined fishing and small agriculture. Meanwhile, its by-products in terms of pollution

and ecosystem destruction meant that many communities were pushed to the brink of subsistence.

They were also exposed to severe health effects caused by the mercury found in the fishes that play a key role in the local diet (Calao and Marrugo, 2015). Such impacts are severely worsened by climate-related reductions to rainfall, since decreases in the daily water flow result in a diminished capacity to dilute pollutants.

Who are the agents of reparation?

The project analyzed in this case study received support by the *Pequeñas Donaciones* (Small Donations) initiative of PNUD channeled through the Natura Foundation. The beneficiaries were twelve individuals from the local of the community, eight farmer women and 4 fishermen and farmers who had lived there all their lives, some of them experiencing harsh socio-economic conditions, all integrating the *Asociación de Pescadores de Tamalameque*⁵ César (ASOPETAM). The project provided them with an opportunity to learn about ecosystem restoration, reforestation, artisanal fishing as well as the importance of caring for water resources to fight against climate change.

What are the forms and mechanisms of reparation?

The reforestation project was carried out in Tatogo and El Cristo marshlands of the Zapatocha complex. They built a plant nursery and restored six acres of native forest. By picking native seeds or young plant specimens up from the streets of small towns and villages and transplanting them to the native forest, people managed to increase the density and resilience of local forest with native species such as mangrove (*Avicennia germinaias*), false pepper tree (*Schinus molle*), calabash tree (*Crescentia cujete*), orejero tree (*Enteolobium cyclocarpium*), pigeown wood tree (*Guazuma ulmifolia*). The most visible impact of such ecological reparation is the partial recuperation of biodiversity, as fishermen learned the art of artisanal fishing and more sustainable management of fishing nets. The community also started sowing plants that brought about the benefits of erosion prevention. Over time, the community built a plant nursery with a stock potential of some 3,000–4,700 plant specimens after transplanting, and now there are 700–1,000 plants ready to be transplanted. Twelve people are now working in the association, with a multiplier effect that has attracted other associations to participate. On the whole, the process of ecological reparation seems to reverberate at the social level, as interviewed project participants relate to have improved their ability to deal with conflicts arising within their community more peacefully and effectively, taking on proactive approaches to combat climate change at a local level.

⁵ Fishermen Association of Tamalameque.

Furthermore, participants felt more empowered and informed about how to preserve nature resources. The RAMSAR zone, that is, a wetland area of international importance according to the convention on wetlands, helped building the plant shelter (nursery) and develop the restoration and reforestation project.

At what scale does reparation occur?

This is an example of reparation based on *biocultural engagement* with factors such as co-management, the strengthening of community organization, the building or improvement of individual and collective capacities including behavioral and attitudinal shifts, and the capacity to plan ahead, as well the interest in sustainable practice, are all part of the successful story conveyed by this case of study. It suggests that for the climate crisis to be tackled most effectively, a simultaneous top-down, bottom-up approach is a key component.

Agroecological and just food production systems in Quito, Ecuador

What is broken and in need of repair?

The case of the urban farmers of the AGRUPAR project in Quito is an example of resistance to urban pressure and inequality, with important nutritional and economic outcomes in terms of hunger and poverty, but also very significant gender implications. Sellers and colleagues have pointed out that in north-eastern Ecuador, household livelihood dynamics are strongly affected by exogenous factors, such as the price of oil and the level of government investment in social development projects. Meanwhile, the adverse impacts of other development policies to promote forest resource extraction are also felt within and among households, such as on women's health, summing up to environmental pressures and migration drivers (Sellers et al., 2017). Some of the impacts on women's health and their families concern forest and oil extraction, processes that often produce contamination of soils and waterbeds. The aforementioned two activities are the cause to women and their families of greater environmental pressures often resulting in environmentally driven rural-urban migration.

The Quito Metropolitan District is located in the Pichincha Province, situated in the north-central zone of the Andean Cordillera, which bisects Ecuador from north to south. The province has a total area of 1,358,100 hectares (IMQ, 1997) (see text footnote 1) of which the Metropolitan District comprises over 290,746 hectares, including the city of Quito proper as well as 24 suburban and rural parishes surrounding the urban core (FAO, 2014). As a result of anthropogenic drivers, agriculture is one of the most sensitive sectors to climate change-related disasters, such as those caused by the encounter between

social vulnerability conditions, physical exposure and increasing climate variability (Soares et al., 2014).

Who are the agents of reparation?

In the city of Quito, Ecuador, the Participatory Urban Agriculture Project (AGRUPAR, by its acronym in Spanish, which also reads as “grouping” or “joining together”) promotes urban agroecological production and food sovereignty (Figure 7). Urban agriculture was promoted by twenty-two Latin American and Caribbean countries through the 2000 “Quito Declaration” as a measure to address poverty, achieve food security, and improve environmental management and governance of cities (Veenhuisen, 2014). As a result of the Declaration, Quito was chosen as a city site to implement a pilot project to test if urban agriculture could be a solution to develop a sustainable food system capable of improving household nutrition while also alleviating poverty. The pilot project was successfully conducted for 2 years and as a result of this experience, the Municipality of Quito created the funding mechanism that led to the creation of the AGRUPAR Project (Renard, 2019). AGRUPAR is financed by CONQUITO, a corporation promoting financial and economic self-reliance, that follows a co-operative and mutual enterprise business model, i.e., a “hybrid” that operates between state-owned enterprises, not-for-profit social enterprises, and for-profit organizations (Mazzarol et al., 2018).

In that context, AGRUPAR has delivered 16,000 training courses in urban agroecology and provided 82,000 visits for technical assistance, supporting more than 21,000 people, of whom 84% are women (Martin-Moreau and Ménascé, 2019). According to Heifer (2014), the AGRUPAR project provides support to 66 peri-urban, urban and rural parishes in the Metropolitan District of Quito (Heifer, 2014). In this segment, women farmers, participants are mostly older adults and many

of them are second-generation migrants from rural areas with Indigenous heritage (FAO, 2014). According to data from the Municipality of Quito, there is a positive relationship between the prevalence of child chronic malnutrition and the interest of people to be part of AGRUPAR (Rodríguez-Martínez, 2019).

What are the forms and mechanisms of reparation?

Participants who are part of this urban agroecology initiative produce a variety of vegetables, herbs, and fruits, especially for household self-consumption. The urban farmers associated with AGRUPAR can sell their products in agroecological farmer markets in different parts of the city, sponsored by the Municipality of Quito, called Bioferias (Rodríguez Dueñas and Proaño Rivera, 2016). The leadership of women in looking after urban gardens serves as a guarantee toward the protection of the right to food security and sovereignty and promotes an economy focused on self-consumption and savings. They promote food sovereignty by cultivating Andean products that are in risk of disappearing and applying ancestral knowledge and techniques to produce them, such as the use of the planting calendar according to the phases of the moon and association planting (Revista Líderes, 2017).

According to an in-depth analysis of the benefits of urban agriculture (Carrasco-Torrontegui and Cardenas, 2021), the urban farmers of Quito generate multiple benefits to their communities, quantified as thirteen different social benefits, three economic benefits, fourteen ecological benefits, and four health benefits.

First, from a *social* perspective urban agriculture promotes intergenerational cohesion and recovers ancestral techniques. Second, urban agriculture generates *economic* benefits to the community, and as such it is a poverty alleviation mechanism that generates a supplementary income and allows participants to have savings. It is estimated that urban farmers can save between \$30 and \$70 dollars when they grow food for self-consumption and can generate extra income of up to \$150 dollars when they sell in the Bioferias (Carrasco-Torrontegui and Cardenas, 2021). Third, urban farming in Quito, from an *ecological* perspective, is a measure that helps to adapt and mitigate climate change (Carrasco-Torrontegui, 2019).

Finally, from a *health* perspective, urban agriculture in Quito helps to reduce under-nutrition, promotes physical activity, and improves mental health (Carrasco-Torrontegui and Cardenas, 2021). Urban agriculture improves the health of those who practice it and of those who consume the food produced in urban areas organically and/or agroecologically. For instance, urban farmers tend to have a more balanced diet, rich in nutritious and fresh foods and urban farming practice serves to improve physical fitness and mental health (Carrasco-Torrontegui and Cardenas, 2021).



FIGURE 7
Woman urban farmer of AGRUPAR's project. Photo:
Carrasco-Torrontegui (2018).

At what scale does reparation occur?

The work of the urban farmers of Quito is an example of *biocultural engagement*, but it also has elements of “do-it-yourself” forms of *resistance* and *reframing nature*, from the perspective that their work represents acts of care to their communities and repairs of their socio-ecological conditions of life. An example is that the urban farmers in Quito to face climate threats and risks have generated several adaptation measures to climate change. For instance, Quito’s urban farmers have put into practice different effective strategies inspired by agroecological principles such as reusing water, recycling waste, wind barriers, mulch application and natural pest control strategies. The development of these measures to adapt to climate change evidence their resilience and autonomy capacities. Their participation in solving problems and carrying out actions to protect nature and their families. For example, according to the work of [Carrasco-Torrontegui and Cardenas \(2021\)](#), Pilar, who is one of the participants of AGRUPAR in her garden, is able to grow more than 20 products on her 80-m plot. She is the head of the household, her daughter, grandson and disable husband depend on her. Through her work in the urban garden, she is able to provide food to her family and provide some products to her fast-food business.

Sustainable and just urban-rural food markets in Guatemala

What is broken and in need of repair?

The case of the Ch’orti’ Mayan community inhabiting the Dry Corridor of the Eastern region of Guatemala, is a good example of urban-rural relationships and local development initiatives severely affected by increasing extreme climate events and associated disaster risks such as recurrent, seasonal droughts and advanced soil erosion ([Hernández et al., 2012a](#); [Imbach et al., 2017](#)). Even though it is an important ecotone of semi-arid ecosystems and a trading region connecting with Honduras and El Salvador transboundary communities, this area continues suffering extreme poverty and food insecurity conditions with lowest adaptive capacity ([Donatti et al., 2019](#)). Yet, local Ch’orti’ communities and their natural ecosystems still have great potential to participate in just markets based on innovative restoration and community engagement initiatives ([Johnson, 2006](#); [Hernández et al., 2012b](#)).

Due to the regional effects of global environmental change and the rising evidence regarding the tangible impacts of climate change, over the last two decades smallholder farmers have been directly experiencing the practical meaning and implications of climate risks, particularly of extreme climatic events within an already highly vulnerable context ([Hannah et al., 2017](#)). Small-scale producers and rural communities in the Dry Corridor of Central America, as well as up near the more remote Petén

region, remain the most vulnerable landscapes to drought and with lowest adaptive capacity ([Holland et al., 2017](#)).

Rural–urban relationships are central to the development of fair markets in Guatemala as they are a historic legacy that shaped the social, ethnic, and economic circumstances of small-scale agricultural systems. Climate vulnerability in Guatemala is shaped by economic and land inequalities along ethnic lines ([Johnson, 2006](#); [Pons, 2021](#)). With more than 16 million inhabitants (INE, 2018), Guatemala has the largest population of Central America. The country presents a young population structure within which 43% is made up of Indigenous people belonging to 21 socio-linguistic Maya groups, primarily settled in rural areas. The Indigenous people from the northern and western regions (Alta Verapaz, Quiché, Huehuetenango, and Sololá) present the country’s highest poverty indices. Guatemala is the most unequal Latin-American country as far as land tenure inequality is concerned, with 2.25% of the population owning 64% of arable land ([Johnson, 2006](#)).

Who are the agents of reparation?

Just food markets can be understood as special types of partnerships aiming not only toward sustainable development conditions for producers tackling strong trading disadvantages but also to provide guidance for consumers ([Garcia, 2014](#)). In practical terms, these types of markets should work as a repairing mechanism that brings different production and trading conditions for land smallholders supporting innovative development and climate-smart solutions ([Hernández et al., 2012b](#)).

Other agents of reparation could be ministries of Environment and Agriculture and other government agencies as well as international cooperation agencies. Such actors have the knowledge and institutional capacity to catalyze reparative mechanisms for local actors in terms of enhancing production conditions and related capacity-building to get involved in targeted just markets. Indeed, these markets seen as development-promoting instruments have the potential to both revalue the cultural asset of Ch’orti’ peoples within the Guatemalan multicultural society and support their engagement in local trading opportunities such as just markets and community entrepreneurship.

When analyzing the case of coffee fair trade, as of 2005, only 17 coffee and 4 honey small producing organizations and the cooperative federation of the primary producers of the sector, FEDECOCAGUA, were certified by the International Agency of Fairtrade Certification (FLO-Cert), hence benefitting from a minimum price or more according to market conditions. Some reparation activities could promote the engagement of local base organizations like the Association of Producers and Farmers of the Ch’orti’ region, known as ASPACH, by replicating the know-how experience and taking advantage from the learned lessons on fair trade opportunities of the leading cooperative organizations mentioned before.

What are the forms and mechanisms of reparation?

The solidarity market is put in place through respectful and mutually beneficial relationships between producers and consumers following criteria based on prices, quality, minimal intermediation, etc. As it occurs with fair trade, solidarity trade is more determined by the relationship established between the producer and the consumer than by the type of product and is difficult to identify on-the-ground (Johnson, 2006).

As in traditional Guatemalan productive landscapes, we observed both basic grains and coffee being grown together within the same plots, along with forested land and pasture. Cardamom cropping systems emerged as an additional example of smallholder crops, often mixed with coffee and basic grains in the central-western region of the country. While migration dynamics among smallholder farming landscapes is the case for most landscapes in Guatemala, another common trend has been for household women to take over the role of head-of-household while men practiced temporary migration for work (Holland et al., 2017).

The opportunities for fair trade growth in Guatemala can strongly benefit from the cooperativism development in other agricultural areas and must be strengthened from both the supply and demand actors of the market. Regarding the supply side, the inclusion of new Guatemalan products in the fair market must overcome the deficiencies on the product and commercialization in terms of infrastructure (roads, lands), training and credit (Johnson, 2006).

The opportunities for productive diversification have to take into account both local potential and market requirements. Current alternatives include traditional products (apiculture, cardamom (Verapaces, Quiché), certified timber (Petén), cashew and macadamia nuts; non-traditional products (vegetables and fruits, such as broccoli, sesame, snow peas, raspberry, and melon) (van Zonneveld et al., 2020), non-traditional forest products: Ramón nuts (Petén), local palm trees (e.g., Xate), and tourism. In less than a decade, Guatemala has reached the first place in exports of cardamom, having the Middle East as its main client (Johnson, 2006).

At what scale does reparation occur?

Rural-urban relationships in the Eastern Highlands and other vulnerable regions within the country have evolved and been shaped more by temporal assistance subsidies from national ministries and less damaging climate events and risks over the last century (MAGA, 2016). As the COVID-19 Pandemic struck in March 2020 and quarantine conditions restricted the usual distribution and trade of products and goods, an array of innovative mechanisms led by grassroots organizations and based on family farming and the agroecology movement influenced the dynamics of rural-urban relationships not only in Guatemala but in different Latin American regions

(e.g., Ucayali region in Peru). The reparation, mainly taking place through the dimensions of *biocultural engagement* and *resistance* (see Table 2) took place at the level of economic regions such as the municipalities of Jocotán, Camotán, Olopa and San Juan Ermita within the Dry Corridor and Chiquimula, the capital city of the Department. The list of multi-actor mechanisms has included direct producer-to-consumer food sales, short value chains that linked rural and urban organizations and individuals supported by national or local governments, newly developed programs on local commerce in rural, urban and peri-urban settings (Tittonell et al., 2021).

Both collective societal reactions and climate adaptation needs of smallholder farmers framed by global trends and triggered by a global public health issue raise reflections toward the suitability of a time for an environmentally-friendly balance of economic opportunities. Reparation ecology can help analyze the possibilities of this case study in search for better human wellbeing and risk management under current climate trends.

Discussion

Comparison: What does contrasting the five cases tell us?

This paper set out to analyze how local initiatives in Latin America, seen through the lens of reparation ecology, can inform and address the interface between climate risk and human wellbeing. We find that they set examples of localizing action and illustrating a different, repairing, emphatic relationship between society, production, consumption, and the environment.

The cases studied were different in terms of scale, urbanization context, and origin of the initiative. The first three cases focused on communities in rural (Tamalameque, Colombia) and peri-urban (the “Vila”, São Paulo; Quilombos, Rio de Janeiro) contexts. The fourth case concerned an urban, city-wide initiative (Quito, Ecuador), while the fifth, set at the country level, focused on rural-urban linkages (Guatemala). This distinction is important, since urban transformation in cities of the so-called Global South does not only take place at the level of their material production but also involves new forms of subjectivities and social relations (Luque-Ayala, 2014). Some initiatives started as top-down solutions, such as the urban farming scheme in Ecuador, initiated by the Municipality of Quito based on a regional Latin American declaration, and the certification scheme (Fair Trade) in Guatemala. Other cases, such as São Paulo and Rio de Janeiro, had a more bottom-up, networked focus, where central activities were avoiding eviction and building alliances with scholars, organizations, and government agencies. In Rio, particularly, there was not a clear “initiative” but rather a series of resistance strategies

aimed at preserving traditional lifestyle and accessing top-down reparation in the form of constitutional right to land.

Despite these differences, there are key threads that run through the five cases. First, all initiatives either directly or indirectly *politicize climate risk* through their different forms of practical action. They shift the view of climate change as consisting of linear, biophysical impacts toward more complex socio–environmental and human–non-human configurations and assemblages, in which climate risk and human wellbeing are hardly separable from the production and reproduction of social, cultural and economic relations.

Second, more often than not, the cases featured *gender dimensions*, and women in leading positions: as matriarchal leaders in São Paulo and Rio de Janeiro, as urban farmers in Ecuador, and as head of farming households in Guatemala. This is noteworthy since women are often seen as disproportionately vulnerable to climate disasters. In addition, it speaks to the idea of reparation of Patel and Moore (2017), for whom gender is a dimension according to which historical and current harm occurs, and thus needing reparation.

Third, the analyses imply *synergies with nature conservation* areas, particularly cases 1–3 on conservation land. Land-use change is a powerful risk factor as the loss of natural coverage often results from impacts by urban infrastructure projects, lessened institutional capacity to enforce conservation area, and socio-environmental conflicts overlapping with the degradation of the wellbeing of vulnerable social groups (Romero-Lankao et al., 2014). In Colombia, the location in a wetland protection zone aided the community to access the land to build the Vivarium project. In São Paulo, the water company eventually stopped the forced resettlement to allow people to continue improving the territory.

Fourth, in several cases, *local ecological knowledge* was channeled to deal with climate hazards, including ancestral farming techniques (Ecuador) and ancient knowledge for managing trails, preventing landslides, and caring for forest (Rio de Janeiro). An interesting question for our linked focus on risk and wellbeing is the role of explicit climate risk perception. While often emphasized in technocratic adaptation studies, high risk perception has tradeoffs with psychological ill-health, and some studies in the region found individual people's risk perception negligible as risk reduction was more likely to be built into local building techniques (Sou, 2018). A possible antidote to doomerism is hereby the degree of convergence between two paths toward climate change adaptation: on one hand, culturally embedded features of ancestral and more sustainable practices, and on the other, explicit techniques and knowledge about climate risks in the face of unsustainable capitalist way of production and resource extraction. Both paths require a cultural turn (a U-turn in the case of Western capitalism) whereas the connector is reparation ecology both as a cultural practice and a material goal.

Finally, the notion of *resistance* is key for the understanding what these few, but qualitatively highly illustrative case

studies tell us about climate change implications, roots and potential solutions. Indeed, as all initiative revolve around in-place practices and strategies of resistance, an analysis of “what is resisted, and why?” becomes paramount (Brink et al., 2022). The answer has been long-since depicted in Indigenous political discourses, afro-descendant political positioning, women's revindication and by those who might even have a predominantly or exclusively western or even white identity, but who have joined in with the marginalized and excluded to reclaim land, water, dignity, as well as social and, more recently, climate justice.

The physical and direct pressures (presented in Table 2) tell a story of dispossession and resistance, impinging either on their right to inhabit the places, or on their activities carried out through communal organization to build, through and based on cultural unity, effective political and economic opposition against hegemonic institutional or market actors. Due to the fragility of Latin American democracies and the presence of vested national and international economic and financial interest related to land and market production at times those pressures have even turned into life-threatening situations.

There are of course as always, many open questions. For instance: what is the role of local environmental authorities? What kind of political acceptance or cultural resonance have these initiatives in Latin-America? Can we talk of reparation ecology without a reference to extractivism and predatory capitalist practices in the region?

Reflections on reparation ecology: Do we really need a new term?

A key discussion for the emerging literature on reparation ecology is: what does the term add in relation to more established concepts, and is reparation ecology a unifying or diversifying approach?

In this paper, we have searched for specificity in terminology and program, both to provide more concrete examples of ecological reparation, and to discuss what reparation is and *is not*. The appropriation of concepts such as “ecology” within the social sciences and, generally, in interdisciplinary milieus tends to stretch the sense and reach of previously well-established concepts and frameworks. We nonetheless maintain that the original definition of ecology put forward by Hackel, ecology as the science that studies the relationships between the organisms and their environments, retains its relevance also in this paper. However, we believe that Odum's (1971) definition of ecology as the study of ecosystems opens up greater possibilities as it makes room for the interaction with both organic and non-organic components of social and economic ecosystems, such as technology.

On a similar note, we highlight the risk that the concept appropriates terminology from more specific use, such as by

the Movement for Black Lives (Ritchie and Stahly-Butts, 2019), or in the context of tort and liability (Sharife and Bond, 2013), both arising from international law. Such appropriation can be problematic if used for white-washing, green-washing, or depoliticizing concepts with a specific, radical meaning. However, from a less territorial perspective, tensions and frictions could also be seen as a positive dialectical dynamic as people or scholars join forces from different epistemological and political backgrounds to fight for climate justice. We thus believe that previous scholarship on reparations contributes important empirical and conceptual dimensions to reparation ecology that should be clearly demarcated, rather than diluted, within the approach.

As regards our study context, we acknowledge the challenge of generalizing our findings and to find ways not only to apply them, but to share them within and beyond Latin America. Indeed, given that so much of what has been thought on reparation ecology seem to be intertwined with the continent's colonization, struggles, and cosmovisions (see e.g., Patel and Moore, 2017; Blanco-Wells, 2021) (in addition to US-based perspectives), future work could address what defines and demarcates reparation ecology as a global research agenda. We see the need for continued methodological development according to the field's transdisciplinary ambition (Blanco-Wells, 2021). Considering that several of the cases featured communities' alliances with NGOs and science as part of their resistance, such methodological research could explore the role of critical (i.e., taking a stance with the disadvantaged, also known as the transformative, or research-activist stance) and qualitative perspectives for producing rigorous climate change science.

Despite the importance of engaging with conceptual debates, our approach is chiefly empirical. We collect evidence, mostly qualitative, to illustrate from local case studies what is being done at a practical level at the forefront of the interaction between social and natural ecosystems. The actions we describe are not new, sometimes they are even the inheritance of ancestral practices or, at least, traditional enough to have been studied under other lenses. Indeed, what we contribute, with others who are working, thinking, acting, and transforming at different scales, is the caring and non-dooming potential of repairing our ecologically threatened way of living in a socially just way.

Conclusions

This paper set out to investigate the emergence and scope of reparation ecology, and through this lens, investigate the contribution of five Latin American grassroots- or locally driven initiatives at the intersection between climate risk reduction and human wellbeing. By doing so, the paper contributes to at least three topics proposed in this Special Issue. First, it illustrates how issues that are increasingly central to the

debate on climate change and intersectionality, such as gender, race and ethnic inequalities, cross-cut the five case studies from the four countries. Second, on this basis, we show how notions of climate risk are entangled with everyday wellbeing, struggles, and the related policy landscape (e.g., constitutional rights of traditional peoples), in ways that are not always recognized in existing national and municipal policies tackling climate risks. Third, through the initiatives analyzed here, we shed light on emerging forms of socio-climatic inequality reduction. In doing so, the paper unveils the non-doomed and ecologically reparative character of these initiatives. Notably, they also tended to repair social relationships and gain attention from local institutions. It contributes to the recent turn of the debate on climate risk, claiming that diverse groups of people and communities around the world are contributing to radical change, tuning their behaviors and social arrangements to what an emerging scholarship defines as reparation ecology. Our adoption of reparation ecology contributes to the emerging reflection on human vis-a-vis non-human relations in the Anthropocene as a domain that needs to be reframed by concepts of equal juridical status, ethical action, non-aggression, care, and respect—rather than just “patching up what is broken”.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

Ethics statement

Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

AL and EB contributed to the idea, literature review, conceptualization, synthetization, and writing. AL, AS, CV-A, AC-T, and ES-L contributed to case-based data collection, analysis, and writing. AL, EB, AC-T, AS, ES-L, and CV-A contributed to the discussion, application of analytical categories, and the revision of the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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