Human Ecology (2023) 51:221–235
https://doi.org/10.1007/s10745-023-00399-9

Conceptualizing Community-based Environmental Peacebuilding in Cesar, Colombia

Samyra Hachmann[1] · Katharina Löhr[1,2] · Héctor Morales-Muñoz[1,3,4] · Luca Eufemia[1,5] · Stefan Sieber[1,5] · Michelle Bonatti[1,5]

Accepted: 15 March 2023 / Published online: 13 April 2023

Abstract
In conflict studies, environmental peacebuilding (EPB) has become an established concept to explain how environmental cooperation among opposing parties provides a platform for peacebuilding. EPB literature has been shaped predominantly by political science perspectives, initially with a focus on interstate conflicts, and ecological dynamics have received little attention to date. Building on the Social-Ecological Systems Framework (SESF), we develop a framework for community-based EPB and test it in post-conflict settings in the department of Cesar, Colombia. We use a qualitative mixed-methods approach, with 26 semi-structured interviews, six focus group discussions, and a World Café session with 30 participants. Our findings show that in six cases communities self-organize to access, conserve, and defend water and land resources while striving to achieve recognition of their civic rights by state actors. A central outcome of cooperation within and among communities is the (re)construction of collective and territorial identities and increased social cohesion. However, community-based EPB does not contribute to improving relations between communities and the private sector or the state, thus failing to strengthen actor relationships that are essential for Colombian peacebuilding. Despite limitations of this exploratory analysis, our approach proves fruitful for integrating ecological aspects in the understanding of EPB. To further develop the EPB concept, future research should look to other disciplines to diversify the understanding of key terms like resource value, cooperation, and peace.

Keywords Community-based natural resource management · Conflict · Cooperation · Environmental peacebuilding · Framework · Social-ecological systems · Cesar · Colombia

Introduction

Around the world, the effects of climate change and the pursuit of unlimited economic growth are putting social-ecological systems under increasing pressure. The fear that this will exacerbate socio-political conflicts has been a long-standing subject of debate among politicians and academics studying the nexus between natural resources, environmental change, and (violent) conflict (Bayramov, 2018; Gemenne et al., 2014; Schleussner et al., 2016; Selby et al., 2017; Swain, 2015). Over the past two decades, research on the nexus between environmental resources and peace has developed the concept of Environmental Peacebuilding (EPB). EPB builds on the assumption that natural resources that are jointly used by parties engaged in conflict, rather than causing conflict, can initiate cooperation and, ultimately, contribute to peacebuilding, because most environmental problems cross political borders and demand a long-term perspective that can provide a 'neutral' space for dialogue (Conca & Dabelko, 2002; Swain & Öjendal, 2018).

While early literature in the field focused mainly on interstate conflicts (Dresse et al., 2019), building on the dominant scenario of two opposing parties, more recent research

✉ Katharina Löhr
katharina.loehr@zalf.de

1 Leibniz Centre For Agricultural Landscape Research (Zalf), Müncheberg, Germany

2 Humboldt-Universität Zu Berlin, Urban Plant Ecophysiology, Berlin, Germany

3 Humboldt-Universität Zu Berlin, Agricultural Sciences, Berlin, Germany

4 Alliance Bioversity International And Centre For International Tropical Agriculture (Ciat), Cali, Colombia

5 Humboldt-Universität Zu Berlin, Resource Economics, Berlin, Germany

highlights the importance of understanding bottom-up approaches and mechanisms to build peace through natural resource management in intra-state conflicts (Ide et al., 2021; Johnson et al., 2021; Krampe et al., 2021; Morales-Muñoz et al., 2021). These studies emphasize the need to account for complex local realities in different conflict settings – including Colombia, where actors from state, society, and the private sectors are often divided by many interests. Scholars point to a need for in-depth case studies and critical reflections on the weaknesses of EPB (Ide 2018b; Reynolds, 2017; Ide, 2020; Johnson et al., 2021).

However, ecological dynamics continue to receive limited attention in EPB research. Many works assume that peacebuilding only has positive effects on environmental sustainability, failing recognize that, in some cases, EPB can be described as "coordinated resource exploitation" (Ide, 2020: 5). Typically these approaches, often stemming from a political science perspective, treat natural resources as exploitable goods whose benefits should be distributed equally among parties in conflict (Dresse et al., 2019; Ide, 2020). This is questionable because the role of the natural environment in local livelihoods goes far beyond the benefits of extracting resources, varying both among and within communities (Agrawal & Gibson, 1999), and because peacebuilding in general and environmental cooperation in particular do not necessarily have positive impacts on environmental sustainability. Regulating the distribution of resources among parties or the ending of violence can also drive extractive economies with negative consequences for ecosystems and local livelihoods dependent on them (Ide, 2020; Johnson et al., 2021). Overall, this shortcoming reflects an untapped potential for further linking EPB to the range of interdisciplinary research theorizing how humans interact with their natural environment in cooperative ways, including sustainability science and political ecology.

To narrow these two research gaps we develop and test a framework that conceptualizes how EPB works at the level of communities and within the social-ecological systems they are part of, specifically, processes of peacebuilding in the region of Cesar, Colombia. To develop the framework for community-based EPB, we draw on community-based natural resource management (CBNRM), making use of the Social-Ecological Systems Framework (SESF) developed by Ostrom (2007) and colleagues (McGinnis & Ostrom, 2014). We chose Colombia for our case study because natural resource management and conflict dynamics are highly interlinked; a linkage also mirrored in the 2016 peace agreement between the Revolutionary Armed Forces of Colombia – People's Army (FARC) and the government.

Given the limited number of in-depth academic studies, our aim is not to test a predetermined hypotheses on causal processes of EPB, but rather to explore contextual factors that enable environmental cooperation. Our overarching research question is how environmental peacebuilding works at the community-level. Specifically for Cesar, we address three questions about environmental cooperation in the context of EPB: why it forms (conditions), how it is implemented (mechanisms), and how it contributes to peacebuilding (outcomes).

Theory

Our analysis builds on the initial understanding of EPB as "the process through which environmental challenges shared by the (former) parties to a violent conflict are turned into opportunities to build lasting cooperation and peace" (Dresse et al., 2019: 104). We therefore adopt an actor-oriented approach toward peacebuilding, focusing on processes of cooperation and their impacts on actor relations and social cohesion (see also Krampe, 2016; Pugh & Ross, 2019).

Based on the existing gaps in EPB research, We argue that adaptability to local actor constellations and the complexities of ecological dynamics are crucial in a framework for community-based EPB. We thus developed a framework based on conceptual elements of the SESF that are linked to some of the initial core theoretical assumptions from EPB research (Dresse et al., 2019), adding to the growing body of literature that recognizes EPB as a more complex phenomenon. The SESF can allow for wider conceptualization of EPB because both concepts focus on the management of natural resources shared by different actors (whether or not there is conflict) who have a common interest in maintaining access to these resources. CBNRM research, which traditionally focusses on the reasons actors cooperate around natural resources, and EPB research, which emphasizes the impacts of cooperation on relations among actor, they have overlapping conceptual assumptions that environmental challenges around natural resources can induce cooperation, cooperation serves to collectively govern shared (common pool) resources and thus to address shared environmental issues, and institutions (as in formal or informal rules) are created to sustainably manage the resource.

The SESF was developed by Ostrom (2007, 2009) and colleagues (McGinnis & Ostrom, 2014; Ostrom & Cox, 2010) as a diagnostic framework providing a common language for developing and testing theories and concepts around the sustainable governance of social-ecological systems comprising a set of first-tier variables that are shared by any social-ecological system, regardless of the type or scale of resource (Basurto & Nenadovic, 2012). These include two ecological system variables – resource systems (RS) and resource units (RU) – and two social system variables – governance systems (GS) and actors (A), which, when combined generate interactions (I) and outcomes (O) in the context of social, economic, and political settings (S) as well as external

ecosystems (ECO) (McGinnis & Ostrom, 2014). Each of these variables is further characterized by several second-tier variables, and all these determine how interactions produce outcomes within so-called action situations that, in turn, affect the variables again (see McGinnis & Ostrom, 2014 for a more detailed description of the framework and Annex A for a list of second-tier variables). The abbreviations GS, A, I, and O, are used to refer to second-tier variables and assign them to respective first-tier variables.

We chose the SESF (McGinnis & Ostrom, 2014) for our study of EPB because of its wide application, its analysis-oriented outlook, its consideration of reciprocal interactions between social *and* ecological systems, as well as its anthropocentric perspective of ecological systems (Binder et al., 2013; Partelow, 2018; Thiel et al., 2015). Unlike other frameworks addressing social-ecological or 'human-environmental' relations, social dynamics are accounted for and the SESF is not limited to specific spatial scales and or resource types (Binder et al., 2013).

To adapt the EPB framework to the local level, it is necessary to look beyond state actors and widen the assumptions of *who* are the central actors within the conflict as well as who are the central actors within the process of peacebuilding through cooperation. Given the diversity of interactions and perspectives at the local level, neither the mechanisms of cooperation, nor the outcomes, should be determined within a framework. Limiting mechanisms to activities such as 'technical cooperation,' the creation of 'neutral spaces of interaction,' and 'dialogue and negotiation,' as in much original EPB work (Dresse et al., 2019), narrows the scope of possible actors in EPB to policy makers or formally organized groups of experts. The same applies to the understanding of what constitutes peacebuilding. While aspects such as ending violence, 'rapprochement,' and the integration of actions (Ide 2018b) may adequately represent peacebuilding at the interstate level, intrastate peacebuilding may face more complex conflict dynamics and is defined through objectives of creating legitimacy (Krampe, 2016), social cohesion (Cox & Sisk, 2017), and opportunities for bottom-up participation (Leonardsson & Rudd, 2015). The understanding of peace and peacebuilding likely varies from context to context and from actor to actor. A framework for studying EPB at the local level should facilitate an analysis of these understandings and the potential tensions they generate rather than delimiting them.

Dresse et al. (2019) define three building blocks to explain EPB dynamics – *conditions, mechanisms,* and *outcomes.* We align these with the central SESF first-tier variables. The *conditions* are characterized by existing resource systems and the resource units embedded within these, as well as actors acting in the context of governance systems. The *mechanisms* are linked to what the SESF terms interactions and the *outcomes* to the variable outcomes of the same name – both connected within action situations (Fig. 1).

The type of action situations that are relevant for studying EPB are those where cooperation, as the interaction, potentially leads to peacebuilding as the outcome. The underlying assumption of how cooperation is induced is that resource units, and the resource systems of which they are a part, create interdependence among actors who are embedded in governance systems, which then prompts actors to cooperate. Second-tier variables provide criteria for analyzing the *conditions* for EPB, as in factors that may facilitate or hinder cooperation (e.g., a high or low number of relevant actors, the presence or absence of government organizations, as well as water or forests as a resource sector). Second-tier variables also serve to systematically identify EPB *mechanisms* (through interaction variables like deliberation, networking, and information sharing). Cooperation can take different forms, including dialogue, participation, collective action, or the management of shared resources, which should not be thought of as distinct categories with one being more 'substantial' than another (as suggested by Dresse et al., 2019), but rather as interlinked processes.

EPB research looks at *if* and *how* cooperation, as the *mechanism*, leads to peacebuilding. Thus, the definition of peacebuilding is crucial and depends on the local context and its actors. Therefore, no fixed definition of peacebuilding is provided, apart from the assumption that actor relations need to improve (e.g., by ending violence, by reconciliation, or by building social cohesion). Such *outcomes* of the action situation are dynamic processes rather than fixed results. They generate political and environmental change (elements also included by Dresse et al., 2019) with feedback effects on the social system, for example by changing governing institutions or actor behavior, as well as on the ecological system, either by strengthening environmental sustainability or by driving environmental degradation, e.g. when facilitating resource extraction.

Methodology

The northern region of Cesar department in Colombia has been heavily affected by armed conflict, especially through the presence of paramilitary forces. Likewise, Cesar has a social-ecological system with an abundance of natural resources and environmental challenges, including water management. It is also an area where conflict lines among various actors (different ethnic groups, armed groups, the private sector, government) persist. Overall, these circumstances create a space well-suited for our exploratory case-study of cooperation on environmental challenges in a conflict-affected context (Fig. 2).

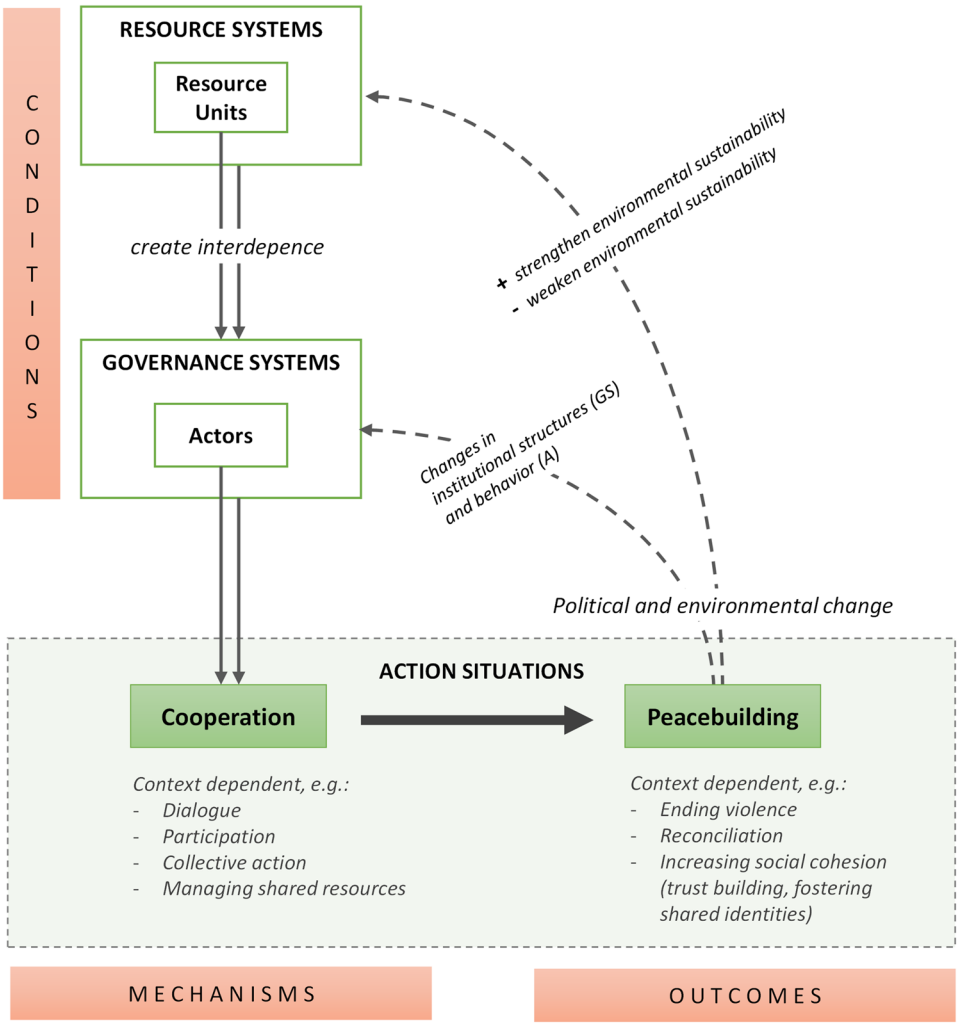

Fig. 1 A framework for community-based EPB (authors' design)

We identified six cases of environmental cooperation at the community-level (Table 1) throughout our interviewing process. The criterion for incorporating a case into our analysis was that it represented a process of cooperation that was initiated by natural resource-related issues. We analyzed cases thus identified on the basis of the three building blocks established in the framework for community-based EPB: *conditions*, *mechanisms*, and *outcomes*.

We adopted a qualitative mixed-methods research approach, with individual semi-structured interviews, focus group discussions, and a World Café session to allow for an inductive identification and in-depth analysis of potential EPB practices, which we later analyzed based on structural the SESF categories. Between September and December 2019, we conducted 26 individual expert interviews and six focus group interviews (five with two participants each, one with four participants). The interviewees came from different sectors: academia (n = 7), the public sector (n = 7), civil society (n = 15; representing NGOs and a political foundation (n = 7), representing local communities (n = 8)), and development organizations (n = 3). Experts were identified through desk research on environmental and peacebuilding initiatives (in academia and practice) in Colombia and subsequent snowball sampling. We required selected interview partners work either in the environmental or the peacebuilding fields or be part of a community engaging in environmental cooperation. The interviews were conducted in Spanish and had an average duration of 54 min.

The interviews were semi-structured and addressed: (a) the role of the environment in the peacebuilding process at the levels of both institutions and implementation; (b) changes in natural resource governance in the years of transition from pre- to post-agreement; and (c) their assessment of the potential of environmental issues to unify actors in Colombian peacebuilding. Regional and local experts in Northern Cesar were additionally asked (e) about environmental challenges in their surroundings, and (f) if and how processes of cooperation unfolded.

To further extrapolate and verify findings, we conducted a workshop in the format of a World Café Session (Brown

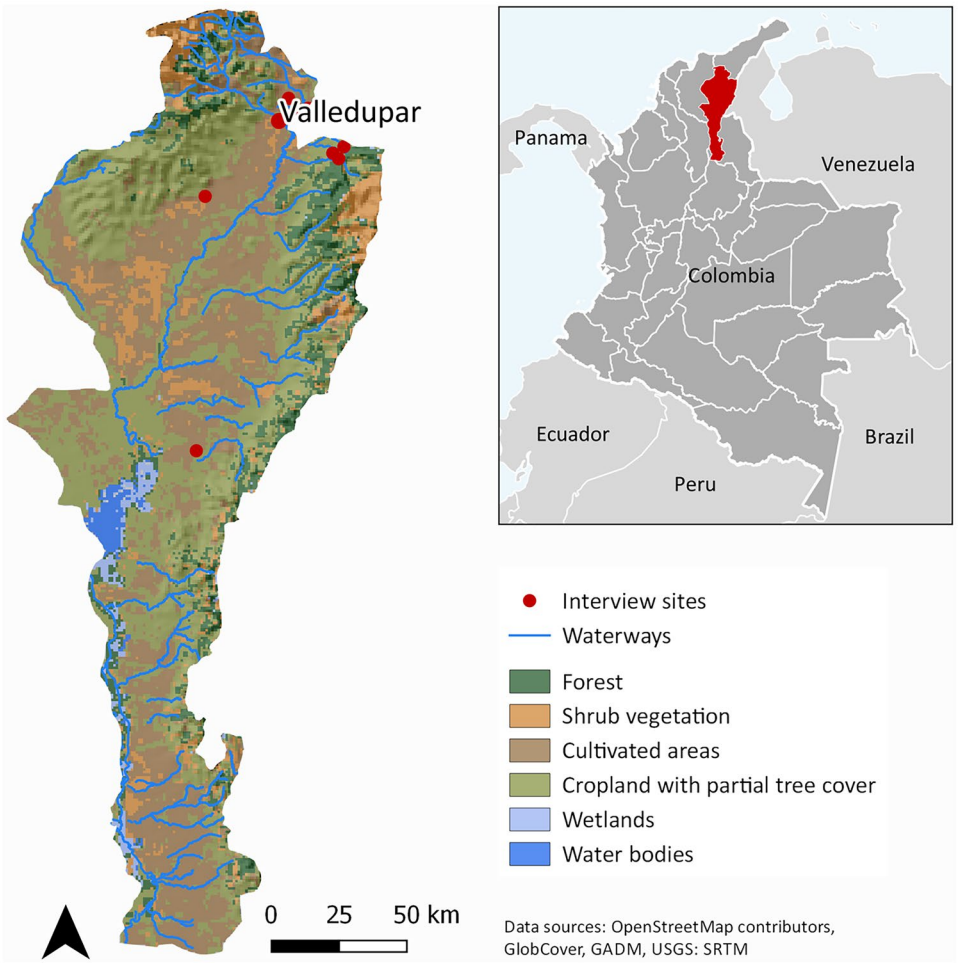

Fig. 2 Map of Cesar with dominant land use classes and sites where interviews were conducted, including the department capital Valledupar (author's cartography)

& Isaacs, 2005; Löhr et al., 2020) in November 2019 in Valledupar, Cesar, with a focus on environmental challenges and existing initiatives in the region. The World Café approach is a method often used in the context of citizen participation and community development, as it brings together large and heterogeneous groups to discuss different topics. The workshop was attended by 30 people representing civil society, academia, and public authorities. After introductions and an explanation of terminology and methods, participants engaged in discussions on community-based

Table 1 Cases of environmental cooperation at the community-level in Cesar. Note that the terms campesino or campesina will be used without translation to refer to small-scale agricultural producers, as the translation to 'peasant' or 'small-holder farmer' loses the terms' cultural and political meaning (see Woods, 2012)

Case No	Community names/ region	Communities involved (n)	Process of cooperation
1	Tierra Grata, El Mirador	2	Aqueduct constructed by two communities (campesino, ex-combatant)
2	Serranía del Perijá	Several (> 3)	Process of establishing campesino reserve zone, regeneration of dried water stream by two opposing communities (campesino, indigenous Yukpa)
3	Guacoche, Guacochito	2	Mobilization for aqueduct construction project, solicitation for obtaining collective land tenure as a community council
4	Sierra Nevada de Santa Marta	Several (> 2)	Defending water resources against exploitation by private sector actors
5	Nueva Esperanza	1	Community-based water management for conservation of available water resources
6	La Sierra (Chiriguaná region)	1	Solicitation for obtaining collective land tenure as a community council
Total		**10 (+)**	

governance, EPB, and land restitution. The discussion on EPB was divided between identifying past and current environmental challenges and socio-environmental conflicts and reflecting on prospects for future peacebuilding through fostering environmental sustainability.

For data analysis, we transcribed all interviews and coded them inductively using MAXQDA software. We developed the coding categories in the context of material from our literature review (Mayring, 2014). Next, we analyzed the coded transcripts in accordance with the framework for community-based EPB: the resulting codes were structured based on the SESF first-tier variables and corresponding second-tier variables (applied according to Delgado-Serrano & Ramos, 2015). This was done in three consecutive steps, corresponding to the three EPB building blocks specified in the framework: *conditions* (identifying variables and variable characteristics that facilitate cooperation), *mechanisms* (identifying forms of cooperation and their impacts on the social system), and *outcomes* (identifying contributions to peacebuilding). For triangulation of interview data, we analyzed the World Café result sheets applying the same coding categories. Using a coding software proved helpful to structure and compare the extensive amount of data generated. While the coding was undertaken by the first author, the software allowed us to consecutively extend and refine categories and to visualize these for discussion and reflection among all co-authors.

Results

As implied in the framework for community-based EPB, results are linked to the first and second tier variables of the SESF. Variables are indicated by *italics* and the abbreviations RS/RU/GS/A. All second-tier variables are listed in the annex (Table A). All quotes are from the interviews we conducted.

Conditions: Environmental Challenges and Actors

Looking at *why environmental cooperation forms in Cesar*, we find that characteristics of the *resource sector*, *value,* and *distribution* create an interdependence among resource users who organize within the frame of *constitutional rules* and in the face of an absence of *government organizations* – if community *leadership* initiates and drives these organizational processes.

Resource Systems and Resource Units

In terms of the *resource sector (RS1),* water and, to a lesser extent, land are the resources most likely to induce cooperation. Water is the subject of cooperation in five of the six cases (all except #6) and land in three cases (#s2, 3, 6). Further, the World Café participants named water access and drought as one of the most relevant present and future risks for conflict and environment. As a resource, water unites actors for reasons that can be grouped into three motivations: creating access, conservation, and defense.

The need to create access to water is addressed cooperatively through the construction of infrastructure. In the case of Tierra Grata (#1), two communities worked together to construct an aqueduct providing both communities with non-potable water from a river 9 km away. The fact that one of these communities was formed in 2016 as a space for reintegration (with its residents therefore ex-FARC-combatants) makes it especially interesting from a peacebuilding perspective. In Guacochito (#3), the need to advance a public aqueduct construction project that had come to a halt led citizens to mobilize for a roadblock.

Actors cooperate for the conservation and recuperation of water resources, as in the case of the Serranía del Perijá, where social leaders from a campesino community and an indigenous Yukpa community negotiated conditions for practices of slash-and-burn agriculture to regenerate a water spring. This is remarkable, given that these communities are involved in a wider ethno-territorial conflict between the campesino and indigenous populations in the Serranía del Perijá. Here, Yukpa communities claim the sole right to inhabit the entire area, which they regard as ancestral land, while campesino communities have settled there after displacement since the 1940s. In Nueva Esperanza (#5), a community located on the outskirts of the Sierra Nevada de Santa Marta, community members organize around the conservation of water that is naturally available, as there is no infrastructure providing access to water.

Communities from the Sierra Nevada de Santa Marta (#4) cooperate in the defense of water resources against exploitation from external actors. The mountains of the Sierra Nevada de Santa Marta are rich in mineral resources, attracting mining companies that are increasingly seeking concessions for resource extraction in the area. While these resources, especially coal, are destined for export and do not benefit the local population, extraction processes require a lot of the water that communities depend on for agricultural production. Consequently, extractive activities like mining and fracking, alongside large-scale industrial agriculture (and the neoliberal economic model behind these practices) are considered the biggest threat to environmental sustainability in Cesar, reflecting the perceptions of national experts.

These three motivations – creating access, conservation, and defense – suggest that, in terms of resource unit variables, the *spatial and temporal distribution* of

the resource *(RU7)* are an important condition for environmental cooperation at the community level. Unequal spatial distribution leaves most communities outside of Valledupar, the department capital, without access to water (and land, see below). At the same time, private sector actors, like mining companies and large-scale farming businesses, have the means to divert water streams without fearing consequences. Thus, in three cases (#s1, 3, 4) communities cooperate to fight for a more equal distribution of water resources. Furthermore, a volatile temporal distribution of water, exacerbated by increasingly long summer droughts, is prompting communities to cooperate for conservation in the cases of the Serranía del Perijá and Nueva Esperanza (#s2, 5).

Another variable that appears to be decisive for inducing cooperation is the *resource value (RU4)*. This is understood not only as the economic value, but also as the environmental and strategic values that a resource has for actor livelihoods (Delgado-Serrano & Ramos, 2015), thus generating a high *importance of the resource (A8)* for actors within the scope of the social system. Livelihoods strongly depend on water, which is primarily associated with life because of the need for drinking water as well as for agricultural production and sanitation. It is this universal need for water that unifies communities: "Every community is independent. But the necessity is common, the necessity of water" (CL8). Apart from this functional value, water is attributed a spiritual meaning with an intrinsic value to be conserved by both indigenous people and also by campesinos.

In the context of expanding extractive activities, land is a second key resource that induces cooperation. Interviewees and participants of the World Café workshop considered land, like water, to be crucial for agricultural production and, thus, their livelihoods. Land is valued as an 'overarching resource' that encompasses other resources, including forests, pastures, as well as water. Land is often connected to the notion of territory, which informants described as: "a being composed of us but also non-human beings that are alive and feel, territory is everything for us" (CL3) and "[it is] where we reproduce our culture, what we are" (CL5). Thus, like water, land is valued far beyond its use as a resource for sustaining livelihoods, but rather is linked to not just the individual but also the collective identity of citizens and communities. In most cases, violence and forced displacement have destroyed these territorial identities. In the process of restoring them, institutional structures for CBNRM play a central role, thus setting important governance system conditions for environmental cooperation at the community-level.

Governance Systems and Actors

In the context of environmental governance and CBNRM specifically there are three forms of community organizations that are anchored in national legislation: indigenous reserves (r*esguardos indígenas*) for indigenous citizens, community councils (c*onsejos comunitarios*) for Afro-Colombian citizens, and campesino reserve zones (*zonas de reserva campesina*) for campesino citizens. These three legal institutions are particularly important for linking CBNRM to peacebuilding for two main reasons: first, establishing and sustaining these structures provides incentives and an institutional frame for participation, dialogue, and collective action; and second, they legally formalize a community's presence in the territory, thus providing an important anchor against displacement by extractive industries.

Nevertheless, the rights these institutions legally grant to communities (in the form of *constitutional rules (GS7)*) are often not respected in practice, particularly for campesino communities, which are often overlooked especially when it comes to environmental governance. Typically, campesinos are falsely perceived as exploitive actors without any interest in sustainable cultivation and resource conservation. Consequently, the strategy of policy makers to limit environmental degradation often favors ethnic groups, indigenous, and Afro-Colombian communities through the formation or extension of national and regional parks that limit all agricultural production, no matter whether large- or small-scale. Several interviewees criticized this approach because it excludes citizens living in these areas and, in some cases, even causes further displacement in the name of environmental protection. While national and regional parks can allow the presence of indigenous communities, they exclude campesinos: "there is a policy called 'parks with people,' but it seems that campesinos are not people, because there is an exclusion when it is about campesinos" (PS5). An example of such a park is in the Serranía del Perijá (#2), where campesino communities have been living since the 1940s, with several periods of displacement and return, yet their presence on the land is illegal because the area was declared a forest reserve in the 1950s. As a result, the state provides neither infrastructure nor public services to these communities.

This leads communities to turn to establishing such legal institutions of CBNRM, with the aim of political representation and recognition from the state, suggesting that it is often the absence of recognition from *government organizations (GS1)* that prompts actors to cooperate for self-organization, as in all our six cases. *Nongovernmental organizations (GS2)*, but also development organizations and universities, act as intermediaries between communities

and the state, accompanying communities in their organizational processes and acquiring funding for cooperation projects, thus providing a supporting role that should not be underestimated.

Nevertheless, proactive social leaders from the communities themselves are the most important actors when it comes to conditions for EPB laid out in the social system, making *leadership (A5)* a critical enabling factor. In all cases, processes of community cooperation are highly dependent on the support of social leaders.

Community-action boards (*juntas de acción communal*) provide institutional structures for intra-community dialogue as well as for political participation and representation of communities toward external actors. As opposed to the three legal institutions of CBNRM, community-action boards are not concerned with aspects of territory and environmental governance and are much easier to form.

Mechanisms: Practices of Cooperation

In terms of *how environmental cooperation in Cesar is implemented*, i.e., the EPB mechanisms, we find three interactions in all six cases of cooperation: *deliberation* processes *(I3)*, *self-organizing activities (I5)*, and *networking activities (I8)*. Given the absence of government organizations and the supporting role of NGOs, all six cases of environmental cooperation are the result of self-organizing activities.

Delgado-Serrano and Ramos (2015) describe the variable *deliberation processes (I3)* as deliberation and knowledge about participation mechanisms and rights, as well as trust building processes. Such interactions took place as communities participated in capacity-building workshops that emphasized trust building and teamwork (#1), by resolving a water conflict through dialogue and negotiation, which reportedly increased trust among leaders (#2), as communities formulated and demanded their rights to water and healthy ecosystems (#4), and as rules for collective water management were developed and enforced (#5).

The formation of, and interaction within, the structures of legal institutions of CBNRM, like campesino reserve zones (#2) or community councils (#s3, 6) are inherently deliberative processes that also generate knowledge of participation mechanisms and rights. Establishing these institutions requires communities and their members to develop a narrative of their collective identity. It also forces them to link this identity to their territory – the territory that their ancestors have been living on for decades but that they have been displaced from various times, remaining without any land rights to. Obtaining these rights is one of the most important post-agreement challenges for many communities in Cesar – and throughout Colombia. One regional expert describes the role of the campesino reserve zone in the Serranía del Perijá: "This is what the campesino reserve wants [to achieve] via its plan for sustainable development; demonstrate that they are collective beings that have a relationship with the land, or the territory, and also with the ecosystems" (AC6). Jointly creating a plan on how natural resources will be managed sustainably is a central part of officially constituting a campesino reserve zone.

Networking activities (I8) can take the form of internal networking (within communities), external networking (among communities), the creation of partnerships, or external communication processes (Delgado-Serrano & Ramos, 2015). While these activities certainly overlap, internal networking took place as social leaders mobilized their community for a joint protest (#3), water conservation was ensured cooperatively (#5), and collective tenure was pursued (#s3, 6). External networking is explicitly found in case 1, in which the construction of an aqueduct united two communities whose members described the experience of physically "working hand in hand" (CL7) for a common goal and sharing meals during the process as an important bonding experience: "in the end it was like we had known each other for years" (CL7). In case 2, the experience of jointly pursuing a campesino reserve zone brought together different campesino communities from the Serranía del Perijá, whose community-action boards undertook the formation of a network to develop a more holistic vision of the territory (PS5). In the Sierra Nevada de Santa Marta (#4), networks between campesino and indigenous communities were strengthened in defending the territory against extractive industries, for example through joint demonstrations. The creation of partnerships, as a third form of networking activities, applies to connections made with third parties like the Food and Agriculture Organization (FAO) (#1), regional, national, and international universities (#s2, 4, 6), or local NGOs (#5). External communication processes as a fourth form of networking were often carried out in collaboration with these partners to raise awareness of the challenges around environment and peacebuilding in these communities. Such processes also served to communicate narratives of collective and territorial identity that originated from some of the initiatives of cooperation.

Apart from self-organization, deliberation, and networking, we identified two additional SESF interaction variables as mechanisms, although less prevalent than the other three: *information sharing (I2)* and *investment activities (I5)*. We observed information sharing such as knowledge transmission, sharing information on the social-ecological system, and learning processes (Delgado-Serrano & Ramos, 2015) where communities participated in training and capacity-building workshops on water management, teamwork, conflict resolution, and resilience, organized by the FAO (#1) or where community

leaders themselves raised awareness about the delay in construction of the aqueduct and about the possibilities of protesting against it (#3). These two cases also feature investment activities through the construction of an aqueduct for water provision.

Outcomes: The Impact of Environmental Cooperation On Peacebuilding

Regarding the ways environmental cooperation may contribute to peacebuilding, our results indicate that cooperation has improved water supply (although only in some of the cases), generated recognition from external, mostly non-state, actors, as well as increased social cohesion within and among communities.

Two aspects were named by informants as the most important for peacebuilding. First, improvement of state-society relations, starting with the recognition and guarantees of equal rights[1] for all citizens. Second, the fostering of collective identities. Forced displacement, threats, and persecution of collective structures have left many communities disrupted and without a sense of collectivity. Consequently, processes of rebuilding collective identities and restoring social cohesion are central components of peacebuilding as understood by regional and local experts.

Reconciliation and trust-building, considered key outcomes in EPB research, play a role only in the reintegration of former FARC combatants (#1) and in the conflict for land and territorial rights between campesino and indigenous Yukpa communities in the Serranía del Perijá (#2). In the other four cases, the relationships within and among most communities were not hostile and people have always bonded over shared experiences of violence and continuous experiences of non-recognition by the state.

To achieve peacebuilding, one interviewee suggests that nothing less than a "*structural change in the dynamics of the state*" (CL3), i.e., a change in the economic, socio-political, and cultural system, is necessary. The question arises whether environmental cooperation at the community level can bring about such changes. When asked to prioritize a dimension or sub-area peacebuilding practice, World Café participants noted two key aspects: promoting a culture of peace and conflict resolution through dialogue and creating governance spaces for socio-political inclusion.

Observed outcomes from what *should be* to what *is* can be divided into three overarching groups: the generation, recuperation, or conservation of water supply (found in three cases); recognition by external actors (found in five cases); and increased intra- or inter-community cohesion (found in all six cases). In terms of SESF outcome variables, the first may be linked to ecological performance measures (O2), while the other two correspond to social performance measures (O1). Given the limited data and the relatively recent emergence of these examples of cooperation, it is difficult to conduct a sound assessment of outcomes (i.e., the impacts on peacebuilding). Therefore, this should be viewed as an exploratory analysis of outcomes observed by the people involved in cooperation rather than an in-depth assessment.

The first outcome – increased access to water – resulted from cooperation in Tierra Grata, where an aqueduct was constructed in the Serranía del Perijá, recovering a water spring by banning the practice of slash-and-burn agriculture in the area surrounding the spring, as well as in Nueva Esperanza, where collective maintenance of a water reservoir ensures a stable water supply throughout the year.

The second outcome – recognition by external actors – resulted from cooperation in five of the six cases, although it was often not what was desired by state actors, but rather by actors from development cooperation, academia, and NGOs. In the Serranía del Perijá, the process of constituting a campesino reserve zone is faltering because government organizations do not support it. Nevertheless, the campesino associations formed to carry out this process evolved into entities of institutional representation that have been approached by state agencies and invited to public participation processes.

The third outcome – increased social cohesion within and among communities (intra- and inter-community level) –differs from case to case. In case 1, inter-community cohesion improved as fears regarding the presence of ex-FARC-combatants were alleviated in the neighboring community and trust was built. In the Serranía del Perijá, inter-community cohesion increased as the territorial and collective identity of campesino communities was fostered. Similar developments were described for the Sierra Nevada de Santa Marta and Guacoche. The outcome of fostering social cohesion is arguably the most difficult to trace back to environmental cooperation, because it is a development embedded in the wider context of peacebuilding, as communities return to their territory and construct new structures of dialogue and participation.

Results Summary

We started with the question: *How does environmental peacebuilding work at the community level*? We find that in northern Cesar, the need to access, conserve, and defend water (and land) resources unites actors within and among communities as they cooperate through processes of self-organization, deliberation, and networking to have their civic

[1] This refers to fulfillment of basic needs as well as the recognition of values, knowledge, production practices, and identities of communities by the state.

rights recognized by state actors. The most important outcome of these initiatives of environmental cooperation is the strengthening of social cohesion at the community level, as collective identities are reconstructed and (re-)rooted in their territory and natural environment. While these processes also contribute to the recognition of communities among external actors, neither the private sector (the main actor group triggering socio-environmental conflicts) nor the state are included. This lack of participation significantly limits the potential of community-based environmental cooperation to effectively contribute to peacebuilding. Nevertheless, results show that community-based EPB can contribute to strengthening both community perspectives and concerns for environmental sustainability in Colombian peacebuilding (Table 2).

Discussion

EPB dynamics are incredibly complex in practice, making it difficult to streamline empirical observations into a coherent theoretical concept. A central motivation for cooperation among community actors in Cesar is defending against extractivism and the environmental degradation it causes, which underpins the ongoing academic debate on the Colombian environment-peace nexus that is largely focused on the ecological consequences of extractivism, notably deforestation, as well as related issues such as soil degradation, biodiversity loss, and water scarcity (Baptiste et al., 2017; Castro-Nunez, 2018; Castro-Nunez et al., 2016; Eufemia et al., 2019; Grajales, 2020; Prem et al., 2020). In northern Cesar, diminishing water supply is severely affecting livelihoods, which

Table 2 Summary of key findings on conditions, mechanisms and outcomes of community-based EPB in Northern Cesar including factors that enable environmental cooperation at the community level to form (conditioning factors) and to contribute to peacebuilding (factors characterizing mechanisms and outcomes). Only conditions and mechanisms are structured along SESF second-tier variables

Conditions	Mechanisms	Outcomes
RS1 Resource sector:	**I7 Self-organizing activities:**	**Generation, recuperation, conservation of water supply:**
Water, land	At the root of community-based environmental cooperation	Fulfill basic needs, improve quality of life, equalize access to natural resources
RU4 Resource value:	**I3 Deliberation processes:**	**External recognition:**
High value for sustaining livelihoods	Key for (re-)constructing narratives of collective and territorial identity	Institutional representation, increased contact with external actors
RU7 Spatial and temporal distribution:	**I8 Networking activities:**	**Increased social cohesion:**
Unequal among actors (water and land), volatile throughout the year (water)	Unifies actors within and across communities, connects communities to actors from academia, civil society and development cooperation	Fostered community identity as a collective linked to the territory and its natural resources
GS1 Government organizations:	**I2 Information sharing:**	
Absence, do not recognize community actors and their realities	Capacity-building workshops, raising awareness	
GS2 Nongovernmental organizations:	**I5 Investment activities:**	
Supportive presence; mediating between communities and state, accompanying organizational processes, acquiring funding	As a subject of environmental cooperation that aims at improving the quality of life (by creating access to water)	
GS7 Constitutional rules:		
Provide frame for organizational processes in communities		
A5 Leadership:		
Proactive		
A8 Importance of resource:		
High importance for sustaining livelihoods		

– in combination with other factors – is motivating environmental cooperation among and within communities. Previous EPB research has also emphasized the importance of water in conflict settings and as a focus of cooperation (see, for example, Burt & Keiru, 2011; Swain, 2016; Weinthal & Johnson, 2018; Septon et al., 2019; Tayia, 2019).

A key finding in support of the peacebuilding potential of environmental cooperation is that it contributes to increasing social cohesion among societal actors as well as to reconstructing and fostering collective identities that are interwoven with the territory and its natural resources. This is reflected in other studies, including Löhr et al. (2021) and Krampe et al. (2021), who find that facilitation of intergroup cooperation reduces bias and prejudice and thus stands out as one of three mechanisms to build peace through the use of natural resource management. Although not in the context of EPB research, other case studies in Colombia also identify the need to rebuild a sense of community and to 'reroot' identities as central peacebuilding challenges and a process that is strongly linked to the natural environment (Le Billon et al., 2020; Lederach, 2017; Nail, 2018). To understand these processes, it is important to recognize the non-economic value of resources, as reinforced by Green (2010) regarding the study of post-conflict resource management and Delgado-Serrano and Ramos (2015) regarding the general application of the SESF. Particularly in early EPB research, however, the value of natural resources is often limited to their economic and functional values, while the idea of (re-)constructing collective and territorial identities is not well established. Ide et al. (2021) contest this in recognizing the importance of local identity and customary institutions for EPB in Timor Leste. The dynamics of EPB in northern Cesar show that what unites community actors is the deeply political process of defending territory and natural resources against external actors rather than the creation of 'neutral' spaces for interaction and technical cooperation.

The cases of environmental cooperation in Northern Cesar show that a major factor limiting the impact of environmental cooperation is the lack of the presence of the state as the most important actor, but also the private sector and the majority of (formerly) armed actors. In our case studies, environmental challenges unite actors from communities, civil society organizations, academia, and development cooperation, but these have arguably always been allies throughout the conflict. Hence, one of the central assumptions in EPB, that environmental issues can provide a bridge to overcome fundamental differences among conflict parties, is not confirmed by our results. It is important to note that state actors, private sector actors, and armed actors respectively are by no means absent from the region. However, as actor groups, they were not substantially engaged in environmental cooperation in our case studies. This might change if more cases were to be identified, e.g., with more time for data collection in the region, and an interesting avenue for future research is thus to identify and analyze cases of environmental cooperation that include state, private sector, or armed actors as principal parties of cooperation.

It is vital to include all actor groups in peacebuilding – not only for reconciliation, which most EPB research focuses on, but also for implementing structural change in socio-political, economic, and cultural systems. Against this backdrop, Morales-Muñoz et al. (2021) emphasize the need for actively creating processes for political participation for conflict transformation in Colombia. Nevertheless, an awareness of power asymmetries between respective actors is vital, as such asymmetries would affect environmental cooperation among communities and both state and private sector actors (Ide, 2020).

Strengths and Weaknesses of the Framework for Community-based EPB

The overall structure of our proposed framework, from the (a) building blocks (conditions, mechanisms and outcomes; adopted from Dresse et al., 2019) to (b) first-tier variables as elements of EPB conditions (resource systems and units, governance systems and actors), and ultimately (c) second-tier variables, proves useful for breaking down the complexities of environmental cooperation. At the same time, all these elements are naturally interlinked, making it difficult to analyze them separately. While it may be a strength of the framework to (a) untangle outcomes from mechanisms, (b) actors from governance systems, or (c) networking activities from deliberation processes, there is a risk of overlooking interconnections. The structure of the framework is useful for exploring factors that enable and shape environmental cooperation (at the community level), less so for tracing and working out linear processes of how cooperation develops and intensifies (see Dresse et al., 2019). The general nature of the framework may be considered a weakness with regard to generating concise findings, however it is beneficial for analyses seeking to disentangle the complexities of environmental cooperation. Just like the SESF, it can make empirical findings more comparable and thus adds to a more complex theoretical understanding of EPB.

To analyze local contexts, it proves to be an advantage to not define mechanisms and outcomes within the framework itself, but rather to identify these in the field, based on stakeholders' understandings. While the range

of variables provided by the SESF was suitable to structure empirical findings on mechanisms, the outcome variables (see annex) are too limited to structure impacts on peacebuilding. This is certainly also because interactions in EPB and CBNRM, both processes of cooperation, show more similarities than the outcomes, sustainable resource management and peacebuilding.

Limitations and Implications for Future EPB Research

While this framework is arguably applicable to a wide range of contexts that feature environmental cooperation, its application and the findings generated are subject to limitations. Although not addressed here, due to the recent emergence of the six initiatives of cooperation, we consider it important to include feedback effects, positive and negative, within an EPB framework (Ide, 2020). Furthermore, ecological dynamics are not studied extensively and only analyzed based on interviewee observations. Still, the framework provides an incentive for future studies to engage more explicitly with characteristics of the resources that are the subject of cooperation.

Overall, our approach to developing this framework, by synthesizing assumptions from EPB with the SESF, an established framework from CBNRM, was fruitful for studying EPB from a new perspective. The field of EPB research is still dominated by political science perspectives and there remains untapped potential for further linking it to research from the interdisciplinary field of sustainability science, which offers a broad range of concepts theorizing how humans interact with their natural environment in cooperative ways.

However, a limitation of this approach is the risk that, even though SESF considers a wide range of variables, a structured framework such as this can hide the complexity of specific factors that are not included in the framework. This is important to note as many conflict areas do show similar socio-ecological dynamics, but contextual factors can still be very different and are a essential to understanding conflict settings and peacebuilding processes.

Future studies can benefit from the approach of inductively developing an understanding of peace and peacebuilding based on the perception of local actors (Le Billon et al., 2020; Lederach, 2017). For example, some studies criticize the implementation of a peace agreement, arguing that the state prioritizes neoliberal peacebuilding approaches through a constrained participation model and privileging foreign investments in extractive industries, which further prolonged marginalization in conflict-affected territories (Berman-Arévalo & Ojeda, 2020; Koopman, 2020; Guasca et al., 2021).

We argue that EPB research would generally benefit from opening up the understanding of some of the concept's key terms, such as resource value, cooperation mechanisms, and peacebuilding, to consider the perspectives of actors from the studied conflict environments. This seems especially relevant given that EPB is a relatively new research field and that some scholars have already declared the concept a myth because the original claims of win–win situations and technical cooperation amongst equals rarely exist in practice (Selby 2003, 2013b; Reynolds, 2017). Our case study illustrates yet again that the ideal of neutral settings for dialogue and depoliticized cooperation is an illusion, especially in conflict environments. With this recognition, it becomes possible to advance the theoretical development of EPB.

Conclusion

As social-ecological systems are increasingly under pressure, there is a growing need to explore how environmental challenges can be tackled cooperatively in ways that foster conflict transformation and community empowerment. Our research shows that the key to identifying and implementing such cooperative approaches lies in diversifying scientific perspectives in peacebuilding research as well as in political and societal voices in peacebuilding practice. By linking EPB research to the SESF, we explored one pathway to do so, approaching EPB from a new perspective and considering research that has theorized processes of environmental cooperation long before EPB became an established concept. It shows that the complexities of environment-peace linkages manifest in social identities, territorial rights, and livelihood strategies that exist within social-ecological systems, which must be considered as a whole, including ecological dynamics. Looking at these elements, further research is needed to better understand their respective influence on outcomes of EPB. Fostering such interdisciplinary connections will help us understand how environmental cooperation can be strengthened to foster peace in communities, countries, and regions worldwide (Table 3).

Annex

Table 3 The first- and second-tier variables of the SESF (from McGinnis & Ostrom, 2014). The analysis in this work further draws from the definitions worked out by Delgado-Serrano and Ramos (2015) as a basis for understanding second-tier variables

Social, Economic, and Political Settings (S)	
S1- Economic development, S2- Demographic trends, S3- Political stability, S4- Other governance systems,	
S5- Markets, S6- Media organizations, S7- Technology	
Resource Systems (RS)	**Governance Systems (GS)**
RS1- Sector (e.g., water, forests, pasture)	GS1- Government organizations
RS2- Clarity of system boundaries	GS2- Nongovernmental organizations
RS3- Size of resource system	GS3- Network structure
RS4- Human-constructed facilities	GS4- Property-rights systems
RS5- Productivity of system	GS5- Operational rules
RS6- Equilibrium properties	GS6- Collective choice rules
RS7- Predictability of system dynamics	GS7- Constitutional rules
RS8- Storage characteristics	GS8- Monitoring and sanctioning
RS9- Location	
Resource Units (RU)	**Actors (A)**
RU1- Resource unit mobility	A1- Number of relevant actors
RU2- Growth or replacement rate	A2- Socioeconomic attributes
RU3- Interaction among resource units	A3- History or past experiences
RU4- Economic value	A4- Location
RU5- Number of units	A5- Leadership/entrepreneurship
RU6- Distinctive characteristics	A6- Norms (trust-reciprocity)/ social capital
RU7- Spatial and temporal distribution	A7- Knowledge of SES/mental models
	A8- Importance of resource (dependence)
	A9- Technologies available
Interactions (I)	**Outcomes (O)**
I1- Harvesting	O1- Social performance measures
I2- Information sharing	O2- Ecological performance measures
I3- Deliberation processes	O3- Externalities to other SESs
I4- Conflicts	
I5- Investment activities	
I6- Lobbying activities	
I7- Self-organizing activities	
I8- Networking activities	
I9- Monitoring activities	
I10- Evaluative activities	
Related Ecosystems (ECO)	
ECO1- Climate patterns, ECO2- Pollution patterns, ECO3- Flows into and out of SES	

Acknowledgements This research is supported by the SLUS project "Implementing sustainable agricultural and livestock systems for simultaneous targeting of forest conservation for climate change mitigation (REDD+) and peace-building in Colombia," which is part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) supports this initiative on the basis of a decision adopted by the German Bundestag (www.international-climate-initiative.com/). We thank all interview participants and SLUS project partners. We would also like to thank the anonymous reviewers for their thoughtful comments and efforts towards improving our manuscript.

Funding Open Access funding enabled and organized by Projekt DEAL.

Data Availability The datasets generated during and/or analysed during the current study are not publicly available due to protect the confidentiality and personal information of respondents but are available from the corresponding author on reasonable request.

Declarations

Ethical Approval This research was supported by the project "Implementing sustainable agricultural and livestock systems for simultaneous targeting of forest conservation for climate change mitigation (REDD+) and peace-building in Colombia," (18_III_106_COL_A_Sustainable productive) which is part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) supports this initiative on the basis of a decision adopted by the German Bundestag (https://www.international-climate-initiative.com/). In undertaking our study, we complied with applicable guidelines and regulations relating to studies with human subjects, including the regulations of the institutional review board at The Alliance of Bioversity International and CIAT (Clearance Letter #2019-IRB23).

Informed Consent All interviewees were informed of the study and its purpose and consented to participate before each interview was conducted.

Conflict of Interest The authors declare no conflict of interest.

References

Agrawal, A., & Gibson, C. C. (1999). Enchantment and Disenchantment: The Role of Community in Natural Resource Conservation. *World Development, 27*(4), 629–649.

Baptiste, B., Pinedo-Vasquez, M., Gutierrez-Velez, V. H., Andrade, G. I., Vieira, P., Estupiñán-Suárez, L. M., Londoño, M. C., Laurance, W., & Lee, T. M. (2017). Greening peace in Colombia. *Nature Ecology & Evolution, 1*(4), 102.

Basurto, X., & Nenadovic, M. (2012). A Systematic Approach to Studying Fisheries Governance. *Global Policy, 3*(2), 222–230.

Bayramov, A. (2018). Review: Dubious nexus between natural resources and conflict. *Journal of Eurasian Studies, 9*(1), 72–81.

Berman-Arévalo, E., & Ojeda, D. (2020). Ordinary Geographies: Care, Violence, and Agrarian Extractivism in "Post-Conflict" Colombia. *Antipode, 52*(6), 1583–1602.

Binder, C. R., Hinkel, J., Bots, P. W. G., & Pahl-Wostl, C. (2013). Comparison of Frameworks for Analyzing Social-ecological Systems. *Ecology and Society, 18*, (4).

Brown, J., & Isaacs, D. (2005). *The World Café: Shaping Our Futures Through Conversations That Matter*. Berrett-Koehler Publishers Inc.

Burt, M., & Keiru, B. J. (2011). Strengthening post-conflict peacebuilding through community water-resource management: Case studies from Democratic Republic of Congo. *Afghanistan and Liberia. Water International, 36*(2), 232–241.

Castro-Nunez, A. (2018). Responding to Climate Change in Tropical Countries Emerging from Armed Conflicts: Harnessing Climate Finance, Peacebuilding, and Sustainable Food. *Forests, 9*(10), 621.

Castro-Nunez, A., Mertz, O., & Quintero, M. (2016). Propensity of farmers to conserve forest within REDD+ projects in areas affected by armed-conflict. *Forest Policy and Economics, 66*, 22–30.

Conca, K., & Dabelko, G. D. (Eds.). (2002). *Environmental Peacemaking*. Woodrow Wilson Center Press; Johns Hopkins University Press.

Cox, F., & Sisk, T. (2017). Peacebuilding: A Social Cohesion Approach. In F. D. Cox & T. D. Sisk (Eds.), *Peacebuilding in Deeply Divided Societies* (pp. 13–31). Springer International Publishing.

Delgado-Serrano, M., & Ramos, P. (2015). Making Ostrom's framework applicable to characterise social ecological systems at the local level. *International Journal of the Commons, 9*(2), 808–830.

Dresse, A., Fischhendler, I., Nielsen, J. Ø., & Zikos, D. (2019). Environmental peacebuilding: Towards a theoretical framework. *Cooperation and Conflict, 54*(1), 99–119.

Eufemia, L., Bonatti, M., Castro-Nunez, A., Morales, H., & Sieber, S. (2019). Colombia's inadequate environmental goals. *Science, 364*(6439), 444–445.

Gemenne, F., Barnett, J., Adger, W. N., & Dabelko, G. D. (2014). Climate and security: Evidence, emerging risks, and a new agenda. *Climatic Change, 123*, 1–9.

Grajales, J. (2020). Losing land in times of peace: Post-war agrarian capitalism in Colombia and Côte d'Ivoire. *The Journal of Peasant Studies, 8*(1), 1–21.

Green, A. (2010). *Social Identity, Natural Resources, and Peacebuilding*.

Guasca, M., Vanneste, D., & van Broeck, A. M. (2021). Peacebuilding and post-conflict tourism: Addressing structural violence in Colombia. *Journal of Sustainable Tourism, 29*(2), 1–17.

Ide, T. (2018). The Impact of Environmental Cooperation on Peacemaking: Definitions, Mechanisms, and Empirical Evidence. *International Studies Review, 49*(1), 65.

Ide, T. (2020). The dark side of environmental peacebuilding. *World Development, 127*, 1–9.

Ide, T., Palmer, L. R., & Barnett, J. (2021). Environmental peacebuilding from below: Customary approaches in Timor-Leste. *International Affairs, 97*(1), 103–117.

Johnson, M. F., Rodríguez, L. A., & Quijano Hoyos, M. (2021). Intrastate environmental peacebuilding: A review of the literature. *World Development, 137*(4), 105150.

Koopman, S. (2020). Building an inclusive peace is an uneven sociospatial process: Colombia's differential approach. *Political Geography, 83*(4), 102252.

Krampe, F. (2016). Empowering peace: Service provision and state legitimacy in Nepal's peace-building process. *Conflict, Security & Development, 16*(1), 53–73.

Krampe, F., Hegazi, F., & VanDeveer, S. D. (2021). Sustaining peace through better resource governance: Three potential mechanisms for environmental peacebuilding. *World Development, 144*(1), 105508.

Le Billon, P., Roa-García, M. C., & López-Granada, A. R. (2020). Territorial peace and gold mining in Colombia: Local peacebuilding, bottom-up development and the defence of territories. *Conflict, Security & Development, 9*(1), 1–31.

Lederach, A. J. (2017). "The Campesino Was Born for the Campo": A Multispecies Approach to Territorial Peace in Colombia. *American Anthropologist, 119*(4), 589–602.

Leonardsson, H., & Rudd, G. (2015). The 'local turn' in peacebuilding: A literature review of effective and emancipatory local peacebuilding. *Third World Quarterly, 36*(5), 825–839.

Löhr, K., Aruqaj, B., Baumert, D., Bonatti, M., Brüntrup, M., Bunn, C., Castro-Nunez, A., Chavez-Miguel, G., Del Rio, M. L., Hachmann, S., Morales Muñoz, H. C., Ollendorf, F., Rodriguez, T., Rudloff, B., Schorling, J., Schuffenhauer, A., Schulte, I., Sieber, S., Tadesse, S., … Weinhardt, M. (2021). Social Cohesion as the Missing Link between Natural Resource Management and Peacebuilding: Lessons from Cocoa Production in Côte d'Ivoire and Colombia. *Sustainability, 13*(23), 13002.

Löhr, K., Weinhardt, M., & Sieber, S. (2020). The "World Café" as a Participatory Method for Collecting Qualitative Data. *International Journal of Qualitative Methods, 19*, 1–15.

Mayring, P. (2014). *Qualitative Content Analysis: Theoretical foundation, basic procedures and software solution*, Klagenfurt, Austria.

McGinnis, M. D., & Ostrom, E. (2014). Social-ecological system framework: initial changes and continuing challenges. *Ecology and Society, 19*, (2).

Morales-Muñoz, H., Löhr, K., Bonatti, M., Eufemia, L., & Sieber, S. (2021). Assessing impacts of environmental peacebuilding in Caquetá, Colombia: A multistakeholder perspective. *International Affairs, 97*(1), 179–199.

Nail, S. (2018). Memory and resilience: A two-pronged approach to natural spaces in Colombia's transition to a peaceful society. *Urban Forestry & Urban Greening, 31*, 48–55.

Ostrom, E. (2007). A diagnostic approach for going beyond panaceas. *Proceedings of the National Academy of Sciences of the United States of America, 104*(39), 15181–15187.

Ostrom, E. (2009). A General Framework for Analyzing Sustainability of Social-Ecological Systems. *Science, 325*, 419–422.

Ostrom, E., & Cox, M. E. (2010). Moving beyond panaceas: A multitiered diagnostic approach for social-ecological analysis. *Environmental Conservation, 37*(4), 451–463.

Partelow, S. (2018). A review of the social-ecological systems framework: applications, methods, modifications, and challenges. *Ecology and Society, 23,* (4).

Prem, M., Saavedra, S., & Vargas, J. F. (2020). End-of-conflict deforestation: Evidence from Colombia's peace agreement. *World Development, 129*, 104852.

Pugh, J. D., & Ross, K. (2019). Mapping the field of international peace education programs and exploring their networked impact on peacebuilding. *Conflict Resolution Quarterly, 37*(1), 49–66.

Reynolds, K. M. (2017). Unpacking the complex nature of cooperative interactions: Case studies of Israeli-Palestinian environmental cooperation in the greater Bethlehem area. *GeoJournal, 82*(4), 701–719.

Schleussner, C.-F., Donges, J. F., Donner, R. V., & Schellnhuber, H. J. (2016). Armed-conflict risks enhanced by climate-related disasters in ethnically fractionalized countries. *Proceedings of the National Academy of Sciences of the United States of America, 113*(33), 9216–9221.

Selby, J. (2013). Cooperation, domination and colonisation: The Israeli-Palestinian Joint Water Committee. *Water Alternatives, 6*(1), 1–24.

Selby, J. (2003). Dressing up domination as 'cooperation': the case of Israeli-Palestinian water relations. *Review of International Studies, 29,* (01).

Selby, J., Dahi, O. S., Fröhlich, C., & Hulme, M. (2017). Climate change and the Syrian civil war revisited. *Political Geography, 60*, 232–244.

Septon, T., Nagabhatla, N., & Sayan, C. (2019). Peace as a Strategy for Planning Water Secure Futures. *OIDA International Journal of Sustainable Development, 12*(12), 51–66.

Swain, A. (2015). Climate Change: National Security Threat *in* D. A. Bearfield, and M. J. Dubnick, editors. *Encyclopedia of Public Administration and Public Policy*. 3 edition. Routledge, New York.

Swain, A. (2016). Water and post-conflict peacebuilding. *Hydrological Sciences Journal, 3*(1), 1–10.

Swain, A., & Öjendal, J. (2018). Environmental conflict and peacebuilding: An introduction. In A. Swain & J. Öjendal (Eds.), *Routledge handbook of environmental conflict and peacebuilding* (pp. 1–13). Routledge.

Tayia, A. (2019). Transboundary Water Conflict Resolution Mechanisms: Substitutes or Complements. *Water, 11*(7), 1337.

Thiel, A., Adamseged, M. E., & Baake, C. (2015). Evaluating an instrument for institutional crafting: How Ostrom's social–ecological systems framework is applied. *Environmental Science & Policy, 53*, 152–164.

Weinthal, E., & Johnson, M. (2018). Post-war environmental peacebuilding: Navigating renewable and non-renewable resources. In A. Swain & J. Öjendal (Eds.), *Routledge handbook of environmental conflict and peacebuilding* (pp. 85–96). Routledge.

Woods, J. (2012). A Word About the Word Campesino. https://www.heifer.org/blog/a-word-about-the-word-campesino.html