

Agrobiodiversity Change in Violent Conflict and Post-Conflict Landscapes

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ABSTRACT

The analysis of agrobiodiversity has mostly neglected conditioning by violent conflict and related processes of social and agrarian change. Similarly, the violent conflicts literature has rarely considered interactions with agrobiodiversity, which involves social as well as biophysical processes. Considering their frequent spatial overlaps around the world, this paper introduces a themed issue investigating how agrobiodiversity and violent (post)conflicts transform each other and are often interdependent. To do so, we bring into dialogue previously disparate lines of research and present the empirical and theoretical contributions of the papers included in the themed issue. Based on this collective work, we call for further synthesis, whereby research working on agrobiodiversity meet and converge with research on violent conflict from various disciplines. The papers that compose this issue evidence how an integrative approach is not only analytically beneficial but also necessary for research supporting the sustainable resolution of conflict, the related conservation of agrobiodiversity and equitable human-environment relations.

1. Introduction

Agrobiodiversity studies have considerably increased in number and scope during the last decades (Zimmerer and Haan, 2017). A growing quantity and variety of local and transnational actors—including peasant, civil society and government organizations, as well as scholars, activists and chefs—have focused their identities, narratives, research, policies, and social mobilization on the biodiversity of food and agriculture. The concept of agrobiodiversity has been mainstreamed for food, seed, and nutrition security and sovereignty, biocultural diversity, and the sustainability of ecosystems around the world (e.g., Brush, 2004; Perales et al., 2005; Pascual and Perrings, 2007; Jackson et al., 2007, 2012; Kontoleon et al., 2008; Altieri and Toledo, 2011; Bioversity International, 2017; CONABIO, 2017; Zimmerer and de Haan, 2019; Bellon et al., 2021; Astier et al., 2021). While definitions vary, we and many contributing authors here draw on the broad definition of agrobiodiversity offered by Zimmerer et al. (2019) as a dynamic set of heterogeneous processes both biophysical and social that compose agricultural and food systems. Major debates have centered on the extent of on-farm crop genetic loss or persistence, the drivers of such change in specific locations and across multiple temporal and spatial scales and the conceptual and practical means for the valuation and sustainable management of crop genetic diversity (Montenegro de Wit, 2016). Drawing on knowledge from several social and ecological disciplines, recent theoretical progress has conceptualized agrobiodiversity as embedded and emergent in human-environment relationships, although unevenly and contingently according to dynamic place-specific conditions (Zimmerer, et al., 2021, *this issue*).

Surprisingly, violent conflict has not figured thus far in the productive rise of agrobiodiversity studies. Research on agrobiodiversity and its actual and potential change across time and space has rather focused on issues ranging from climate change, agricultural intensification, market integrations, and demographic processes such as migration and urbanization, and how they are linked to (mostly neoliberal) policy shifts (e.g., Bellon et al., 2011; Eakin et al., 2014, 2018). All these issues are rooted in a long history of capitalist agrarian transitions, many of which burst into violence and war (Cramer and Richards, 2011; Thomson 2011). In fact, contemporary armed conflicts are often located in agrobiodiversity hotspots, featuring peasant and Indigenous agrobiodiversity stewards (Richards and Ruivenkamp, 1997).

The themed issue that we introduce here thus stresses the need to engage in the analysis of how agrobiodiversity and violent conflict interact, as a means to study broader social- and political-ecological processes. Since the publication of two seminal works by Sperling (1997) and Richards and Ruivenkamp (1997), just a few studies (featured in the following sections) have focused on the transformations and functions of agrobiodiversity during and after conflict. In this introductory paper, we bring into dialogue previously unconnected research and present the empirical and theoretical contributions of the papers included in the themed issue. The latter address regions in Laos, Thailand, Burundi, Bolivia, Colombia, and Mexico. Based on this collective work, we argue that, in some contexts, agrobiodiversity can be better understood when analyzed through its interactions with violent conflict, as well as vice versa: agrarian violence and war are often conditioned by their interactions with agrobiodiversity.

Two preliminary conceptual caveats are warranted. First, it is important to clarify that although we acknowledge the multiple and interrelated forms of violence, including structural, cultural, gendered, and environmental (Galtung, 1969, 1990; Watts, 1983; Nixon, 2011; Le Billon, 2013; Lahiri-Dutt, 2015; Narchi, 2015; Le Billon and Duffy, 2018), we focus on cases in which physical or direct violence has ignited. Such an analytical boundary not only helps narrow the object of study—as not all violence is physical and not all conflict is violent—but is also methodologically convenient, since overt physical violence amidst a conflict more clearly reveals involved actors and processes. The second clarification relates to our approach to the ‘post-conflict’. Given that physical violence may (and often does) cease but temporarily—that is, only as part of a chronicle, dynamic conflict, rather than constituting the end of conflict, as the prefix ‘post’ could suggest—we conceive the post-conflict period or space from a broad historical perspective and not as a synonym of a peaceful environment. Indeed, the causes of conflict often persist after confrontations have stopped. After all, ‘many wars are long periods of (uneasy) peace interrupted by occasional eruptions of violence’ (Richards, 2005a, p. 5). Importantly, as shown by Baumann (2021, *this issue*), agrobiodiversity processes may be informed by memories of violent conflict as well as by forecasts of its reignition.

2. Overarching themes in studies of agrobiodiversity in conflict and post-conflict landscapes

2.1 Direct and indirect effects of conflict on agrobiodiversity

Since the 1990s, a few mostly unconnected pieces of scholarly and policy research have analyzed the effects of violent conflict on the presence and diversity of smallholder farm animals, crop species, and local varieties, as well as on the social institutions and seed systems that supply and reproduce them. This research has covered different types of conflicts in a number of countries in Africa, Asia, and Latin America.¹ Both the direct effects of conflict and its indirect consequences have been analyzed. Pillage, looting, and the destruction of seeds, crops, livestock, and working instruments directly impact smallholder agricultural production (Sperling, 1997; Richards and Ruivenkamp, 1997; Kundermann, 2000). Armed confrontations often cause the destruction or blocking of buildings and infrastructure for irrigation, storage

¹ Specifically, in Western Africa (Sierra Leone, Liberia and Guinea-Bissau), Central Africa (Rwanda, Angola and Burundi), Eastern Africa (Uganda, South Sudan and Burundi), Southeast Asia (Cambodia, Laos, Myanmar and Thailand), South-central Asia (Afghanistan), and Latin America (Bolivia, Peru, Colombia, Nicaragua, Guatemala, and Mexico).

(including silos and seed banks), transportation (i.e. roads), and selling of agricultural goods (Sperling, 1997; Richards and Ruivenkamp, 1997). Scorched earth tactics may involve all shocks mentioned above (Steinberg and Taylor, 2002). The dangers of accessing agricultural fields and markets in a war-torn area often make farming too risky (Richards and Ruivenkamp, 1997). In such constraining circumstances, farmers may have no other choice than to sell or consume their animals or seed reserves in order to survive (Kundermann, 2000). Agricultural decline or even halt is thus endured, also as a consequence of killings, imprisonment, forced displacement, forced resettlements, forced conscription, and the decision by peasants to take up arms and become members of insurgent or counterinsurgent militias (Guhuray and Ruiz, 1997; Richards and Ruivenkamp, 1997; Richards, 2005b). Agricultural labor decreases proportionally (Sperling, 1997; Ingalls and Mansfield, 2017).

State policies during and after conflict may also directly impact agrobiodiversity (Baird, 2021, *this issue*). Deliberate agriculture disruptions include state support of high-yielding crops and production systems for national food self-subsistence as a war strategy, sometimes privatizing land or banning local agricultural systems that are based on a diversity of native crops and varieties (Guhuray and Ruiz, 1997; Sperling, 1997). For example, as analyzed by Ingalls et al. (unpublished) in post-conflict Laos and Cambodia, large-scale land acquisitions by foreign companies—with the financial and coercive support of the state—have recently caused the almost total substitution of swidden cultivation and forest areas by export monocrops, dispossessing and displacing smallholder farmers. The process has been legitimized by anti-narcotic narratives (specifically, through an opium poppy substitution program) for state control of these peripheral areas, causing the erasure of traditional agroecosystems and associated agrobiodiversity.

Violent conflict may have indirect effects on smallholder agriculture through the impoverishment of farmers, which limits their access to seed and other agricultural inputs. Seed may in fact be available but not accessible to farmers due to their decreased purchasing power. Alternatively (or concurrently), the agrarian social relations that constitute informal seed systems may be damaged, thereby decreasing seed accessibility (Richards and Ruivenkamp, 1997). Such ‘relative lack of seed’ (Sperling, 2001; Sperling et al., 2004) stresses the social character of agrobiodiversity (Zimmerer et al., 2019, 2020). Trust and understanding among farmers are sometimes broken (Richards and Ruivenkamp, 1997); their religious practices associated with local varieties and agrobiodiverse systems abandoned (Steinberg and Taylor, 2002); the gender or age roles organizing production and livelihoods dislocated (Kundermann, 2000; Richards, 2005b; Cely-Santos and Hernández-Manrique, 2021); and agricultural knowledge no longer transmitted and reproduced (Christensen, 1990). The disruption of these and other agrarian social relations, including informal seed systems, may have greater effects on the persistence of agrobiodiversity in the long run than the loss of seed itself (Richards and Ruivenkamp, 1997; Sperling, 1997).

The type and extent of the impact on agrobiodiversity will greatly depend on a number of characteristics of each conflict (Richards and Ruivenkamp, 1997; Sperling, 1997; Kundermann, 2000; Sperling et al., 2004), including its: (1) *magnitude*, in terms of the degree and types of shocks; (2) *duration*, given a tendency to decrease the resilience of the agricultural system the longer the conflict, which highlights the relevance of multi-scale temporal analyses; (3) *timing*, especially with respect to agricultural periods (e.g., before or after the harvest; interrupting the agricultural cycle or not); (4) *spatial extent*, given that localized conflicts will hardly affect regional/metapopulation dynamics; (5) *evenness*, since different places in the same region may experience conflict differently; and (6) *predictability*, which increases coping, mitigating, and adapting capacities.

2.2 Positive outcomes and the functions of agrobiodiversity during conflict

Yet positive outcomes for agrobiodiversity as a result of violent conflict occur as well. Similar to wildlife ‘gunpoint conservation’ (Dávalos, 2001; Alvarez, 2003), the isolation of peasant communities due to war has caused the conservation or even enrichment of crops, landraces, and agrarian social relations. In the Angolan Civil War, for instance, agrobiodiversity was conserved in areas controlled by the rebels, unlike other areas where the government introduced high-yielding varieties at the expense of local varieties (Matos, 1998). Amidst the geopolitical isolation in Burundi, Moseley (2021, *this issue*) found positive

preliminary results from an agricultural intensification program based on crop-livestock management with local varieties and no external inputs. Hernández et al. (2021, *this issue*) documented a favorable outcome in isolated communities in the central region of Chiapas, Mexico, who belong or are allied to the Zapatista military and political movement, where agroecological projects for food and seed sovereignty have been developed during or following conflict, albeit unevenly. In Sierra Leone, rebel attacks during the mid-1990s favored agrobiodiversity as well. A larger number of households and household members were found to be involved in traditional agricultural production, and more rice varieties were grown than before the attacks. Sampled households in Sierra Leone stopped growing cash crops and focused on food crops as a self-subsistence strategy in the context of war (Longley, 1997).

Agrobiodiversity has in fact been a key resource for risk-management in the face of conflict. As with other types of shocks (e.g., related to market, policy, climate change, pests and diseases), the diversity of crops and varieties or landraces is often intentionally conserved and managed by smallholders against risk—in this case, against the typical uncertainties of a conflict or post-conflict setting (Moseley, 2021, *this issue*). Diversity allows a wide range of responses. As noted by Sperling (2001) regarding the aftermath of the Rwandan genocide, ‘early maturing varieties might help stave off hunger; staggered harvests help to minimize risk (especially of [crop] theft)’ (p. 990). Also related to risk-management, Tamariz (2021, *this issue*) found that in Oaxaca, Mexico, most peasant communities growing marijuana and/or opium poppy diversified their (food) policulture system (*milpa*) rather than specializing in these illegal crops, partly because diversification is used as a visual diversion (that reduces exposure) and as a food insurance (that reduces sensitivity) to violent shocks. In focal areas of illegal crop production in Oaxaca, only those peasant communities who were both highly organized and heavily armed were able to minimize the (internal and external) violence associated with this illegal enterprise, while conserving their *milpa*. This case contrasts with eastern Afghanistan, where Ingalls and Mansfield (2017) found that war destroyed key environmental, labor, and market elements on which food cultivation depended, and this in turn led to a near total cropland conversion to poppy—which was more convenient to grow than traditional food crops given its superior materiality, profitability and marketability within the specific conditions of the conflict.

Table 1. Overarching themes in studies of agrobiodiversity in conflict and post-conflict landscapes. Italics indicate articles in this issue.

THEMES	AUTHORS CONTRIBUTING
1. Direct and indirect effects of conflict on agrobiodiversity	
a. Destruction, pillage, and looting of agricultural stocks, inputs, instruments, and infrastructure.	Sperling, 1997; Richards and Ruivenkamp, 1997; Kundermann, 2000; Steinberg and Taylor, 2002; Ingalls and Mansfield, 2017
b. Dangerous and/or limited access to fields, seeds, markets and other agricultural and livelihood means.	Richards and Ruivenkamp, 1997; Sperling, 2001; Sperling et al., 2004; Cely-Santos and Hernández-Manrique, 2021
c. Agricultural decline or halt from murder, imprisonment, displacement, conscription, or taking up arms.	Guhuray and Ruiz, 1997; Richards and Ruivenkamp, 1997; Richards, 2005b; Baird, 2021; Tamariz, 2021
d. Conflict-related state policies limit or foster agrobiodiverse systems.	Guhuray and Ruiz, 1997; Sperling, 1997; Baird, 2021; van Dexter et al., 2021
e. Breakdown of social relations and agricultural knowledge.	Christensen, 1990; Richards and Ruivenkamp, 1997; Kundermann, 2000; Steinberg and Taylor, 2002; Richards, 2005b; Ingalls and Mansfield, 2017
2. Positive outcomes and the functions of agrobiodiversity during conflict	
a. Conflict-related isolation tied to agrobiodiversity conservation.	Matos, 1998; Hernández et al., 2021; Moseley, 2021
b. Agrobiodiversity conservation as a risk management strategy.	Longley, 1997; Sperling, 2001; Tamariz, 2021; Moseley, 2021

c. Agrobiodiversity for resistance to injustice and oppression.	Borras et al., 2008; Altieri and Toledo, 2011; Zimmerer, 2012, 2015; Kloppenburg, 2010; 2014; Montenegro de Wit, 2017; <i>Hernández et al., 2021; Baumann, 2021; van Dexter et al., 2021</i>
d. A non-essentialist approach to agrobiodiversity	<i>Zimmerer et al., 2021</i>

3. Migration and food sovereignty in (post)conflict landscapes

a. Seed survival and viability during the journey and in the sending and receiving landscapes of migration	Christensen, 1990; Sperling, 1997; Kundermann, 2000; Steinberg and Taylor, 2002; <i>Baird, 2021; Zimmerer et al., 2021</i>
b. Informal seed networks foster collective action and agrobiodiversity resilience in post-conflict landscapes	Guhuray and Ruiz, 1997; Sperling et al., 2004; McGuire and Sperling, 2013; Zimmerer, 2015, 2017; Hellin et al., 2018; Escárraga-Torres et al., 2020; <i>Baumann, 2021; van Dexter et al., 2021</i>

Smallholder agrobiodiversity has also been mobilized by smallholder farmers during violent conflict for territorial resistance to injustice and oppression. They have done so both symbolically and in practice, publicly and privately. Publicly, the Zapatista case described above (*Hernández et al., 2021, this issue*) and related agrarian movements based on the concepts of ‘Living Well’ (*Buen Vivir*) and food and seed sovereignty are clear examples of such resistance (Borras et al., 2008; Altieri and Toledo, 2011; Zimmerer, 2012; Kloppenburg, 2014). Privately, spaces of agrobiodiversity management that smallholders keep hidden from states’ and overlords’ view and control, also known as ‘fugitive landscapes’ or ‘shadow landscapes’, have contributed during centuries to the resilience of agrobiodiversity in Andean regions where agrarian transitions are being forced (Zimmerer, 2015). In post-conflict, or post-Peace Accord (*posacuerdo*) Colombia, Baumann (2021, *this issue*) analyzed the role of agrobiodiversity related institutions and agricultural practices during indigenous and peasant struggles against capitalist development projects, in favor of local environmental governance. Farmers increasingly mobilized agrobiodiversity, in both private and public spaces, as a symbol of water and land access, the maintenance of cultural traditions, and food sovereignty, as well as a material practice of environmental governance through land use. In short, they mobilized agrobiodiversity as a vision of social-environmental governance. Relatedly, also as part of the negotiated transition to peace in Colombia, van Dexter et al. (2021, *this issue*) analyzed peasant resistance (through strikes and demonstrations) to state supported agribusiness (namely, the privatization of seeds and the implementation of coca substitution programs with export cash crops) as part of the defense of territory and the human and more-than-human relationships and ‘life plans’ (*ibid.*, p.4) that constitute agrobiodiversity. In the context of this agrarian struggle, peasant agrobiodiversity (of farmers, seeds, soils, and a multitude of other species) is countered by agribusiness necropolitics. Across the world, grassroots, peasant, and Indigenous movements against the privatization of seed and other commons have involved legal and sometimes violent confrontations, with varying outcomes (Kloppenburg, 2010, 2014; Montenegro de Wit, 2017).

Zimmerer et al. (2021, *this issue*) warn us, however, against treating resistance as inherent in agrobiodiversity. Their research in different contexts of migration- and resource-related conflicts in Bolivia shows a notable contrast between agrobiodiversity’s role in resistance to sociocultural domination and injustice, on the one hand, and agrobiodiversity as central to processes that reinforce unequal social power relations and political oppression, on the other. This contrast reflects agrobiodiversity’s function as a mobile or unfixed social symbol, with important meanings and usages that inspire social change (also see Baumann, 2021, *this issue*, and Hernandez et al., 2021, *this issue*).

2.3 Migration and food sovereignty in (post)conflict landscapes

Migration processes have been central to agrobiodiversity change in relation to violent conflict. Displaced peasants often bring their seeds in order to grow them in receiving areas of migration, or in the hopes of eventually returning and resuming production. In receiving areas, growing migrated-seeds is not always successful due to the difficulties of seed preservation during the journey, and because of the different environmental conditions encountered in the host landscapes, which may result in crop failure (Sperling,

1997; Kundermann, 2000; Steinberg and Taylor, 2002). Seed survival and viability also depend on the political context in the receiving areas. For example, cooperative relationships in refugee camps in Afghanistan, due to tribal connections, supported the reproduction of agricultural systems (Christensen, 1990). Quite differently, the study of Baird (2021, *this issue*) in the Laos/Thailand borderland accounts for the loss of seed due to the weak political status of refugees, despite their potential ability to bring seed across the international border and grow it properly. Laotian migrants could no longer continue the swidden system on which their seed depended, partly because this agricultural system was banned in Thailand but also because of their (stateless) powerlessness to evade the banning, unlike Thai farmers within the same region.

Research evidences that farmers who remain in the conflict area will seek to continue managing the agricultural system and its agrobiodiversity within their material possibilities, unless those who fled are indispensable in possessing key agricultural knowledge (Christensen, 1990). During and after conflict, displaced peasants generally find support through informal seed networks, favoring the re-localization of agricultural production and consumption and, relatedly, strengthening the food sovereignty of these communities (Zimmerer, 2017). Farmer-to-farmer seed acquisition networks are found at different geographical levels, including the cross-community level, which becomes increasingly relevant in times of seed shortages due to shocks (Zimmerer, 2015). In fact, in stressful situations, such as conflicts and their aftermath, farmers are willing to travel much longer distances than usual in order to get seed, even internationally (Guhuray and Ruiz, 1997; McGuire and Sperling, 2013). A case in point was found in South Sudan, where farmers obtained 90% of their seed from informal channels despite chronic violent conflict and government seed aid (McGuire and Sperling, 2013). The combination of informal seed systems and local agrobiodiversity governance has been central to post-conflict recovery, as shown by Amazon Indigenous peoples in Colombia, who specialized in the cultivation of coca at the expense of agrobiodiversity and suffered forced eradication and massive out-migration, but later organized in order to collectively abandon coca and resume their traditional agricultural system (*chagra*), which is based on a diversity of native food crops and varieties (Escárraga-Torres et al., 2020).

Informal seed system crops and varieties are usually recovered in post-conflict landscapes, unlike crops and varieties that depend on formal (i.e., non-farmer) sources of seed (Sperling, 1997; Zimmerer, 2017). In Rwanda, bean production was stable during conflict due to its reliance on informal seed markets, whereas potato production declined because of its dependence on formal sources of seeds, fertilizers, and fungicides (Sperling, 1997). External aid/relief or development programs during or after conflict that focus on strengthening informal seed systems and related social structures and institutions for local agrobiodiversity management (e.g., through seed vouchers and fairs) have proven more successful than the direct distribution of seed (Sperling et al., 2004). Seed aid may in fact undermine seed system resilience if promoting the dependence on purchased seed and other external inputs for fertility and pest control (Kundermann, 2000; Steinberg and Taylor, 2002; McGuire and Sperling, 2013). Instead, the reliance on and strengthening of local or adaptable saved seed, informal seed networks, and self-produced agricultural inputs reduces the vulnerability and strengthens the collective action of farmers, as well as the resilience of their social-ecological system to ongoing and future conflict and related environmental stressors (Hellin et al., 2018).

3. The contributions of this themed issue: Theoretical perspectives

The contributors to this themed issue examine these and other thematic areas by employing a diverse set of theoretical perspectives that strongly advance agrobiodiversity research, especially within conflict or post-conflict contexts (see Table 2). Authors' engagements with frameworks including social-ecological systems (SES) and political ecology (PE), along with theoretical attention to the more-than-human, expand understanding of the interwoven relationships that compose, conserve and transform agrobiodiversity. Other authors integrate agrobiodiversity scholarship with critical agrarian studies and critical development literature to assess how agrobiodiversity relations shift in response to infrastructure, development programs and violent conflict. Finally, a set of papers in this issue extend agrobiodiversity research that works across

political geography, with authors theorizing political and geopolitical concepts of peace, isolation and violence in the context of human-environment agrobiodiversity relations. Taken as a whole, the contributions to this issue demonstrate the strength and diversity within Geography and cognate disciplines to understanding the interactions between agrobiodiversity and conflict.

As a dynamic set of processes in agricultural and food systems created and maintained by both social and biological factors, research on agrobiodiversity through the lens of SES permits productive integrative analysis at the crossroads of multiple mid-range theories and concepts. In this issue, for example, Tamariz (2021) works at the intersections of SES and PE related vulnerability theory to investigate whether the production of illegal drug crops drives agrobiodiversity loss in Mexico's state of Oaxaca. Tamariz crosses SES concepts of thresholds and shocks with PE's focus on power to demonstrate that agrobiodiversity conservation in smallholder communities producing illegal drug crops in fact mitigates violent agrarian change often associated with militarized 'eradication' efforts. A similar integration of concepts by Zimmerer et al. (2021) draw on SES and PE within the authors' concept of 'infrastructure entanglements' to examine the longitudinal change in the utilization and spatial distributions of Andean maize agrobiodiversity across Bolivia's Cochabamba region in relation to fluxes in labor flows, irrigation infrastructure, and migration. The longitudinal data reaffirms agrobiodiversity's 'emergent' properties (Zimmerer, 2013) amidst agrarian change and points to agrobiodiversity's importance for human health, sociocultural identity, and climate change resilience. Both Baumann's and Zimmerer et al.'s contributions to this collection, empirically set within areas of large-scale irrigation development, demonstrate that agrobiodiversity does not disappear but plays significant roles within intensifying agrarian landscapes.

Table 2. The contributions of this themed issue: Theoretical perspectives.

THEORETICAL PERSPECTIVES	CONTRIBUTING AUTHORS
Social-ecological systems	Tamariz, 2021; Zimmerer et al., 2021
Political ecology	Baird, 2021; Baumann, 2021; Moseley, 2021; Tamariz, 2021; Zimmerer et al., 2021
Feminist political ecology	Baumann, 2021; Zimmerer et al., 2021
More-than-human	van Dexter et al., 2021; Zimmerer et al., 2021
Critical agrarian studies	Hernández et al., 2021
Critical development studies	Baumann, 2021; van Dexter et al., 2021
Political geography	Baird, 2021; van Dexter et al., 2021
Geopolitics	Moseley, 2021

The framework of PE informs agrobiodiversity research in diverse ways throughout this issue given PE's emphasis on power and other relations of social difference with respect to environmental change and resource use. While Zimmerer et al. draw on PE to conduct a gendered, intersectional analysis of agrobiodiversity users, Baumann (2021) engages PE-informed environmental governance to examine the daily material practices of agrobiodiversity of smallholder Colombian producers in post-Peace Accord southern Tolima. She draws selectively on concepts from feminist care ethics to theorize how daily practices, and notably those of women, are productive of alternate visions for more equitable futures. Evidence from interviews, household-level surveys and ethnographic research demonstrates that agrobiodiversity practices realized in spaces of seed exchanges, gardens and kitchens become a frame for a vision of environmental governance that prioritizes food sovereignty, equitable access to land and water and sustainable resource use. Van Dexter et al. (2021) similarly investigate how smallholders' relational practices of agrobiodiversity, understood through a more-than-human framework, enact an understanding of 'territorial peace' contrasting more extractivist plans for post-conflict rural development.

Within the broader literatures on critical development and agrarian studies, a third current in the themed issue brings insights from political geography to bear on agrobiodiversity relations. Baird's (2021) detailed historical account of the forced migration of ethnic Kuy (Souay) Indigenous peoples from Laos to Thailand evidences how violent conflict can lead to the abandonment of native seed varieties or agrobiodiverse traditional practices, a question also central in the work of Tamariz (2021). Framed within

political geography, Baird extends his analysis to Thai state policies regarding citizenship and land access for displaced persons. His findings emphasize the need to account for indirect influences on agrobiodiversity and conflict linkages, a conclusion also central to the piece by Zimmerer et al. (2021). Relatedly, Moseley's (2021) research interrogates geopolitics' impacts on agricultural practices and rural development. Results show that within post-conflict Burundi's geopolitical isolation, one locally co-developed agricultural intensification program led to an increased use of native seeds and agrobiodiverse systems. By engaging perspectives from political geography and geopolitics, these authors highlight the effects of state-level decisions seen in local agricultural decisions.

Papers from Hernández et al. (2021) and van Dexter et al. (2021) work across critical agrarian and development studies debates to assess how agrobiodiversity may increase within contexts of conflict or even provide a pathway towards peace. Continuing the thread of direct versus indirect effects of conflict on agrobiodiversity, Hernández et al. (2021) extend the line of questioning to include short- and long-term consequences of armed conflict-agrobiodiversity interactions. Through a case study of Indigenous communities that belong or are allied to the Zapatista movement in Chiapas, Mexico, the authors illustrate how the conflict led to successful and lasting grassroots projects of agroecology and seed sovereignty. These findings suggest that in certain contexts of armed conflict, or geopolitical isolation as in the work of Moseley (2021), the effects on agrobiodiversity may be positive. Similarly looking to agrobiodiverse practices of smallholders in areas of conflict, van Dexter et al. (2021) draw on ethnographic evidence from Colombia's Putumayo to argue that to construct the notion of peace from the territory (*territorio* being a rich concept in many areas of Latin America) provides a more productive understanding of peace than that of militarized peace, or peace tied to capitalist development, so often promoted by the Colombian state. Their concept of 'territorial peace' draws insights from more-than-human thinking and writing on necropolitics (i.e., the selective instigation of violent death as a form of governance; Mbembe, 2003) to link agrobiodiversity relations, especially those around native seeds and soil fertility, to broader notions of *territorio* and peace.

Taken together, the papers in this themed issue thus advance research on agrobiodiversity and conflict or post-conflict landscapes in multiple significant ways. First, the detailed empirics emphasize and reaffirm the emergent dynamics of agrobiodiversity. Within active armed conflict, geopolitical isolation, post-conflict tensions, and other situations of agrarian change, agrobiodiversity relations play central roles in food sovereignty, community resilience, climate change mitigation, cultural identity and visions for peace and equitable environmental governance. Relatedly, many of the papers emphasize the symbolic function of agrobiodiversity relations, therefore extending research that highlights their instrumental biological or social functions. Third, the diversity of case studies presented covers a swath of temporal durations and contributors take care to define types of conflicts and their direct and indirect, as well as short-and long-term effects, on agrobiodiversity. Finally, the papers integrate multiple theoretical perspectives with agrobiodiversity research of seeds and agricultural systems to assess pressing issues of social identity, power relations, equitable development, migration, illegal cultivation, and state responses and involvement in violence.

4. Conclusion

Throughout these pages we have demonstrated the great complexity of violent conflict-agrobiodiversity interactions, which are often indirect and non-linear and not always negative. Although heterogeneous and contrasting as they are, in all the cases that we have analyzed here the ways violent conflict developed were conditioned by agrobiodiversity processes, and these in turn were transformed by the physical and psychological effects of the use or threat of violence. Such interdependence has been mostly overlooked by scholarship on each side of the equation, despite the spatial overlaps of agrobiodiversity and violent conflict around the world.

Therefore, while thinking of the future development of these understudied relationships, we call for further integration, whereby research working on agrobiodiversity from various disciplines, such as agroecology, ethnobotany, evolutionary ecology, and agricultural economics, meet and converge with

research on violent conflict from disciplines such as peace and conflict studies, political ecology, agrarian political economy, and geopolitics. The seven papers that compose this themed issue show how this interdisciplinary approach is not only analytically beneficial but also necessary for the sustainable resolution of conflict and related conservation of agrobiodiversity.

Additionally, this themed issue signals pathways for further investigations into the power of agrobiodiversity interactions to inspire social change. Contributing authors evidence that, as violent conflict and its effects reshape social-environmental relationships, the complex cultural, social, political, and symbolic functions of agrobiodiversity may ground communities' identities and propel more sustainable human-environment systems. The collection of papers presented here urges other researchers to evidence the connections between agrobiodiversity, peace, and social change.

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