COMMUNING WITH OTHERS:

More-Than-Human Communities Of Mexican Ecovillages

by
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Abstract of Dissertation submitted by:
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This dissertation explores the entanglements of knowledge and place in the construction of sustainable socioecological systems by focusing on the emergence of ecovillage communities in Mexico. Ecovillages, or communities designed with the intention of creating self-sustaining socioecological systems, have grown in popularity in recent years, reflecting a growing interest in communal living, regenerative agriculture, and degrowth as responses to climate change. Framed as "laboratories of sustainability," or sites where sustainability knowledge might be produced, scholars have speculated how insights gleaned from existing ecovillages might be scaled up or transposed to other contexts.

In contrast, this work places a critical focus on placemaking as a co-creative process between human and more-than-human ecovillage residents, asking how the conception and practice of sustainability mutually shape one another. This research helps to better understand the politics of knowledge creation that underlies divergent sustainable imaginaries, or visions of how ecologically harmonious livelihoods might be pursued, which in turn depend closely on the more-than-human relationships that anchor them to place. Drawing on ethnographic fieldwork carried out in ecovillages across Mexico, I explore how different plants, animals, insects, and microorganisms are drawn into and influence the narratives of each community, and how these other beings contest, revise, or unmake human plans for them. I use these examples to argue for an understanding of sustainability that accounts for both more-than-human futures and the place-based socioecological contexts in which sustainability projects are situated.

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List of Abbreviations

A.C. – Asociación Civil (Civil Association)

ANT – Actor Network Theory

INECOL – Instituto de Ecología (Institute of Ecology)

ITI – Iterative Thematic Inquiry

SEP – Mexican Secretary of Public Education

(STyPS) – Mexican Secretary of Labor and Social Security

WWOOF – Worldwide Opportunities on Organic Farms

Preface

A tape started with a voice talking in a soothing voice, inviting us to imagine what it was like to be a seedling in the ground. A person came around to each of us and brushed our arms and back gently, then gave us a slight shoulder squeeze. As the tape went on, painting a picture of life stirring in the ground, someone came around, crunching dry leaves and sprinkling us with soil, rubbing it gently on our arms. We were slowly guided up to a standing position, the soothing voice still going on, slowly fading away. It felt meditative, peaceful, and the black blindfold was cool and soft on my face.

Suddenly, the sounds of chainsaws started–at first far away, then louder and louder. Loud footsteps on the concrete floor to my right somewhere. Suddenly, someone came and grabbed my upper arms forcefully, shaking them down to my side in a rough way. We were pushed and prodded down to a sitting pose again, and then someone came around, forcefully guiding our shoulders down to the ground, pulling our legs out front violently, in jerked motions. The smell of cigarette smoke invaded my nose, and a hefty whiff of gasoline wafted in. The sound of footsteps again, panting, like someone was out of breath. Grabbing my wrist, they checked my pulse with two fingers, breathing hard and worried. Two hands crossed on my chest and the person pumped lightly, mimicking resuscitation. A deep sigh, and a pulse check again. This time, they lowered my wrist softly to the ground, as the sound of a heart monitor flattening played in the background.[1]

When our blindfolds were removed, the workshop participants that were assembled at the ecovillage community of Aldea Ceiba[2] were invited to discuss our experiences as a tree. At first, each of the participants was silent. As we started to go around the circle and describe

[1] Field Notes, March 29, 2020.
[2] All names of communities and research participants are anonymized in this dissertation, unless otherwise specified.

our impressions, I noticed that more than a few people were visibly upset. A middle-aged woman who had traveled from Queretaro with her husband cried as she described the experience of being "cut down." "When you cut me, I could really *feel* it," she said through sharp gasps of air, "and it makes me sad what we are doing to this planet." Another young woman, a biology student from a nearby city, echoed her concerns while her eyes welled up with tears: "so many other species are in trouble, and the rest of the people in my generation– they don't seem to care, it makes me so angry." "This is why we're here together," said Gloria, the workshop facilitator and one of the community's founders, lowering her voice to a calm whisper: "We're here to help, to think about how to solve these issues by *becoming part* of nature again."

Introduction

As climate change and environmental degradation have begun to weigh more heavily on the public conscience over the last decades, it might be said that the future of human life on Earth feels more uncertain than ever. In October 2018, following the Intergovernmental Panel on Climate Change's (IPCC) Report on the anticipated effects of further unchecked global temperature rise, media outlets and politicians began to sound the apocalyptic alarm. Alexandria Ocasio-Cortez, a Congresswoman from the United States, made national headlines for declaring in an interview that the "world is going to end in 12 years if we don't address climate change" (Zhao 2019). In the closing of the 73rd General Assembly of the United Nations, General Assembly President María Fernanda Espinosa Garcés commented that "we have just over a decade to avoid the worst impacts of climate change, and to achieve our vision of a safer, fairer, and more sustainable world," adding that "we must choose whether this moment is remembered as one of crisis, or one of opportunity" (2019). It has become clear that the "interrelated crises of climate, food, energy, poverty, and meaning" (Escobar 2018, x) present unprecedented challenges to human livelihoods, and require urgent action. There is still little consensus, however, on what such "sustainable futures" might look like, let alone how to bring them about.

While sustainability has become a widely recognized and evocative concept, it is also a deeply contested and mutable one (Waerther 2014). For some critics, the definition of sustainability has come to be so open-ended that it has lost its rhetorical power: a kind of "fuzzy concept" (Gunder 2006) which paradoxically "can never be imagined as a form of society with a set of specific features, as its promise represents a radical break with the existing reality through which our (current) imaginations are constituted" (Brown 2016, 128). Because sustainability can (and often does) serve as a catchall term that extends to diverse stakeholders with competing goals (Gunder 2006; Murphy and McDonagh 2016; Brightman

and Lewis 2017), the deployment of the concept has often worked to "maintain the existing status quo of class inequalities, with limited regard to the environment" (Gunder 2006, 116). On the other hand, a broader rendering of sustainability also leaves room for a diverse range of post-development alternatives that derive meaning and from their connection to place (Escobar 2015; Demaria and Kothari 2017; Lockyer 2017). In each sense, however, sustainability becomes the product of a subjective mathematical equation, hinging on the assortment of variables and constraints provided by whoever the solver might be.

The prospect that there is not "one sustainability" but rather "multiple articulations of the concept" (Hiedanpää et al. 2012) has important implications for using it as a unifying goal. Following Murphy and McDonagh (2016), "sustainability projects are also scale-making projects," and "in accessing them as research objects we are also accessing the politics of sustainability scales as they are imagined and practiced" (xxi). If there are circulating multiple "sustainable imaginaries" (Murphy and McDonagh 2016)–inflected by culture and senses of place, constituting a pluriverse of possible perspectives (Kirksey and Helmreich 2010; Blaser 2014; Escobar 2018)–how might it be possible to achieve the broad-scale societal transformations that experts concur is necessary to adapt to extreme planetary change in the coming decades? Moreover, how might these differing versions and narratives of sustainability map onto one another, be brought together, or made commensurate (Escobar 2015; Demaria and Kothari 2017)? And what do these understandings about sustainability and its practice reveal about our assumptions and priorities as human beings–and what are the consequences of maintaining this anthropocentrism in our sustainable designs?

This dissertation argues that sustainable futures and their imaginaries hinge on the lives of more-than-human others–nonhuman beings, both living and not, that collectively compose and shape the natural world. This more-than-human perspective, discussed in greater depth in chapter 2, is premised in the understanding that "human lives and ways of

life cannot take place and be described in isolation" (van Dooren et al. 2016) Although most studies of sustainability "focus only on human plans and programs," argues Tsing (2017), "meaningful sustainability requires multispecies resurgence, that is, the remaking of livable landscapes through the actions of many organisms" (51).

This dissertation explores the emergence of ecovillage communities (*ecoaldeas*) in Mexico to trace how sustainability narratives emerge and are transformed through practices of care for more-than-human others. Ecovillages are forms of intentional communities oriented towards ecological and social sustainability (Kasper 2008; Wagner 2012), often defined as "human-scale settlement[s] in which human activities are harmlessly integrated into the natural world in a way that is supportive of healthy human development, and can be successfully continued into the indefinite future" (Gilman 1991). These sustainable world-building projects also require the participation of a host of nonhuman others (Brombin 2019), from crops and livestock to uncultivated forests or soil horizons, in the construction of community socio-ecological systems. Understanding ecovillages as more-than-human assemblages (which are in turn composed and maintained through situated patterns of care) problematizes the notion of ecovillage as a transferable and scalable model for sustainable development (D'Amato 2021). Instead, I argue that engagement with more-than-human others in the production of sustainable communities necessarily result in a "post-development rainbow" of alternative practices and community-based solutions that emerge in place. (Demaria and Kothari 2017, 2592).

Ecovillages serve as rich texts for examining how broader sustainability narratives are absorbed, interpreted, and practiced at the community level. Since the popularization of the ecovillage concept in the 1990s (Wagner 2012), examples of ecovillage communities have emerged throughout the world, becoming nodes in increasingly networked global movements (e.g., the Global Ecovillage Network): as Jackson (2004) describes it, "global phenomenon

responding to global causes" (1). Despite surface-level differences between communities, residents of ecovillages are ostensibly oriented towards the shared goal of developing sustainable and ecologically harmonious livelihoods (Litfin 2016; Farkas 2017) that work to "regenerate social and natural environments" (Global Ecovillage Network[3]). This definition is deliberately capacious, leaving open possibilities for what individual communities might look like.[4] Rather, ecovillages are framed as "laboratories of sustainability" (Singh et al. 2019; Lockyer 2017): "not a particular outcome, but an ongoing process…a living and learning centre for a regenerative future, a place of continuous exploration" (Global Ecovillage Network).

This experimental process of designing more sustainable livelihoods is underpinned by each community's situated responses to and critiques of emergent socio-ecological crises. As Lockyer (2007) demonstrates in his ethnographic work on intentional communities in the US, such communities serve as "manifestations of cultural critique," represented both through "epistemological critiques of dominant ideologies and institutions and cross-cultural juxtapositions through which alternative ideologies and institutions are created" (i). In this sense, ecovillages are also instructive because they reveal how these contestations work to produce alternative political and socioecological realities (Lockyer 2007; Burke and Arjona 2013), as communities "take the threats to our way of life seriously, and are taking personal action to deal with the problem…walking their talk." (Jackson 2004, 2).

Drawing on ethnographic research with ecovillage communities throughout Mexico, I seek to explain how different narratives of sustainability are implicated in and (re)produced in distinct settings. On the surface, the communities of Aldea Ceiba, Rancho Bosque, and Tierra Madre–three key sites consulted for this study located throughout Mexico–share many

[3] "What Is an Ecovillage?," Global Ecovillage Network, https://ecovillage.org/projects/what-is-an-ecovillage/
[4] In recent years, the Global Ecovillage Network has expanded the definition of ecovillage to encompass traditional and urban communities in addition to "intentional" (i.e., newly created) communities which is "consciously designed…to regenerate their social and natural environments."

similarities with one another, as well as with other ecovillage communities documented in Mexico and around the globe. Residents envisioned their communities (whether ideally or in practice) to be guided by the goal of *autosustentabilidad* (self-sufficiency), designing systems for providing for their community's needs that were intimately linked with the land. Each community experimented with similar kinds of practices for putting their respective visions for social and ecological harmonization into action, including growing their own food, reforesting "wild"/non-agricultural spaces, or producing renewable energy. On closer inspection, however, each community differed greatly in the ways that they approached this task, making use of different strategies, practices, aesthetics, and patterns of daily life. These material differences, I argue, underlie and articulate with broader conceptual differences, reflecting a place-based politics of knowledge creation.

1.1 Research Questions

To address these broader aims, I pose the following research questions:

1. How do different sustainability imaginaries and practices depend on and shape the more-than-human assemblages of ecovillage communities?
2. How are ecological knowledge and conceptions of place iteratively shaped through practices of care for more-than-human others in ecovillages?
3. How are these sustainable place-making attempts influenced, contested, or unmade by the more-than-human ecovillage residents?

1.2 More-Than-Human Sustainabilit(ies)

Examining ecovillage sustainability narratives through an anthropological lens helps to understand how "values and practices, ontologies and epistemologies interact and change, paying attention to the details of the everyday as much as to the exotic" (Brightman and Lewis 2017, 2). Crucially, such an "anthropology of sustainability" (Maida 2007) must not

only be directed towards understanding human cultural difference, but also how more-than-human others are implicated in these plans (Brightman and Lewis 2017; Tsing 2017).

Despite differences between ecovillage communities explored here, a common thread in their understanding of sustainability was the concept of "living in harmony with nature." Such a perspective implies reaching a state of optimal balance between humans and their surrounding environments, in which humans have "basic material and nonmaterial needs satisfied," while also understanding and acting "in ways that indicate...that they are embedded in nature and dependent on it" (Magdoff 2012). Learning how to grow food, raise animals, or manage land and water resources, oftentimes in unfamiliar environments, challenge ecovillagers' concepts of "nature," as well as their attempts to work with and within it. More-than-human others are important in the design and functioning of ecovillage communities (e.g., Brombin 2019), in part because they allow ecovillagers to relocalize the production of food, energy, materials, and even ecological services by shifting these burdens onto more-than-human lives. In such instances, nonhumans become crucial to ecovillage success not only for their productive capacities, but also because of their role in validating or challenging human attempts to design coherent socioecological systems. In order to trace these relationships in an organic way, the structure of this dissertation takes assemblage theory as inspiration. I take up each element of the assemblage process in turn–gathering, coherence, and dispersion (Anderson and McFarlane 2011)–as a way of narrating the ecovillage "life cycle," or how communities form, hang together and develop, but also how they unravel and transform into something new.

The first research question explores how understandings of sustainability are enacted through and negotiated in relation to more-than-human others. Navigating the edge between autonomy and interconnectedness (Farkas 2017) requires ecovillage residents to engage in the intellectual and physical labor of negotiating community values in relation to place; as I

will argue in chapters 4 and 5, this gathering process hinges on (and is traceable through) the inclusion or exclusion of certain more-than-human others. Through this value negotiation process, ecovillage residents "not only transform natural landscapes, but also transform their individual and collective subjectivities," (Singh 2013) which in turn shapes relationships to the landscape and the more-than-human others that ecovillagers care for.

The second research question explores the epistemic and material consequences of engaging more-than-human others in sustainability plans. As ecovillages arrange and compose more-than-human others for particular purposes, they are also guided by their own understandings of which or whose knowledge matters, and why. Because many ecovillage residents come to their respective communities from elsewhere, they import various kinds of knowledge (about how to grow food, raise animals, or manage land and water resources) that may have been formed in other contexts. As different kinds of sustainability-related knowledge (e.g., permaculture, biodynamics, agroecology, local traditional methods) are brought together within the contexts of particular communities, these forms of knowledge are transposed onto the more-than-human assemblages in each place.

Finally, understandings of how more-than-human others function together as parts of broader systems changes the trajectory of care practices, in turn influencing understandings of sustainable systems. For example, while two communities discussed here focused on soil regeneration as a community priority, this was accomplished through enlisting more-than-human others in distinctive ways (e.g., livestock, microorganisms, or native trees). These expectations might also be undone or contested by nonhumans, who sustain their own lifeways and social relationships beyond human control (Abram 2012; Whatmore 2006): local plants cultivated to hold water in the soil, increase biodiversity, or provide food sources for local insects may wither or die without apparent cause, while other unwanted plant species might "volunteer" and flourish in garden beds. Managing these relationships is a

continuously shifting practice that is never holistic or complete, complicated by the supposition that human caregivers cannot fully know the complex inner workings of the social lives of more-than-human others. For this reason, ethnographic attention to more-than-human others can reveal how they are crucial to communities in ways that hinge not only on their productive capacities, but also with respect to their role in validating or challenging attempts at designing sustainable communities.

1.3 Sustainable Communities in Mexico

Mexico's ecological, cultural, and historical context provides rich ground for understanding how divergent sustainable imaginaries emerge from different places. Much research on ecovillage communities has tended to centralize case studies in Europe and North America, often framed as iterations of a "model" that might be "scaled up" to other contexts (Pathiraja 2007; Fischetti 2008; LeVasseur 2013; Litfin 2012, 2014; Singh et al. 2019; Ergas 2021). While some of this work has suggested that ecovillages and similar projects might contribute to global sustainability initiatives (Dias et al. 2017; Singh et al. 2019), there has been comparatively little attention to how sociocultural, political, and geographic contexts influence the emergence and survival of sustainable communities–particularly in "Global South" countries. Mexico's complex history of land tenure expropriation and privatization (and the related impacts of foreign speculation) have created an uneven landscape for sustainability projects, where some prospective residents have greater access than others. While Brombin (2019) remarks that ecovillages in Mexico is an almost unknown social phenomenon, the foundation of new communities every year speaks to growing interest in the ecovillage community model, as well as an increasingly varied and diverse field of sustainability practices at eco-communities. Exploring how new understandings of sustainability are shaped by the places and multispecies relationships where they emerge in

turn helps to understand the challenges of enacting sustainability protocols, particularly those which are human-centric.

In Mexico, ecovillage communities are situated at several geographical and epistemological convergences that influence the creation of "sustainable livelihood" narratives. Many ecovillage residents–city dwellers, urbanites, foreign migrants, or tourists–encounter the realities of rural or ecological livelihoods for the first time in ecovillage spaces. The practices and patterns that characterize ecovillage life connect to a broad number of social and environmental movements, particularly concerning indigenous rights and biocultural patrimony (Carruthers 1996, 1997). Moreover, the growing popularization of the ecovillage concept and a proliferation of such projects through Mexico reflect how community-directed, grassroots environmentalist initiatives have become increasingly networked and globalized. These values suffuse and influence the ways in which ecovillagers design and construct their communities, and the ways they draw on or engage with traditional and indigenous knowledge (discussed further in chapter 5).

In the sections that follow, I explore the contextual factors in which Mexican ecovillage projects are embedded to understand how different kinds of sustainability narratives emerge and circulate. Through this discussion, I call attention to the ways that the processes I detail in the rest of the dissertation–designing, constructing, and maintaining sustainable communities with more-than-human others–are rooted in broader socioecological, political, and historical contexts that are specific to place.

1.3.1 "*La Tierra es de Quien La Trabaja*" (The Land is for Those Who Work It)

Mexico has a complex history of land tenure legislation, characterized by significant pendular shifts between private and communal forms of land ownership, and this legacy continues to impact the development of rural communities to this day. Following the

Mexican Revolution in 1917, over one-half of Mexico's arable land was redistributed to indigenous communities and groups of smallholders through a process of land reform that was enshrined in the new Mexican constitution. The issue of land ownership had been a key point of contention in the leadup to the outbreak of hostilities (Grindle 1986). Under Mexican President Porfirio Díaz, land was expropriated from the rural poor on a massive scale and consolidated in *haciendas*, a system of landed estates owned by social elites (*patrones*) and supported by peasant labor. In the years prior to the outbreak of the Mexican Revolution, this resulted in an extreme social disparity, whereby "90 percent of Mexico's population was landless, and only 15 percent of the indigenous communities retained possession of their traditional communal lands" (Grindle 1986, 38; Sonnenfeld 1992). "*La tierra es de quien la trabaja*" ("The land belongs to whomever works it") became a popular rallying cry of the Revolution, and as it drew to a close, land reform became one of the key issues in the drafting of the new Mexican constitution.

The resultant *ejido* system enshrined usufruct rights for particular communities (often indigenous) who occupied and worked on lands together (Perramond 2008). Under the *ejido* system, it was not legally possible to sell or rent portions of land as it was effectively owned by the community and could not be parceled off (Stephen 1994). While the implementation of the *ejido* system was successful in the sense that it returned land to communities from which it had been expropriated, the legal provisions created the basis for the bureaucratization of land management, some of which persists today (*Ibid.*). However, state support for *ejidos* was removed gradually as investments in the modernization of agriculture were prioritized (Grindle 1986, 63). Although support for landless indigenous and smallholder communities was seen as a dominant engine for social development at the beginning of the 20th century, agricultural productivity became increasingly defined in terms of capital accumulation rather than subsistence (Grindle 1986; Perramond 2008). This shift in

state investment coincided with a period known as the "Green Revolution," a period in Mexican agriculture characterized by rapid expansion of rural infrastructural and techno-managerial approaches to land management and crop production (Sonnenfeld 1992). Supporting smaller agrarian communities was seen to be incommensurate with the move towards agricultural modernization and neoliberal policy reforms. Although some interpreted this as evidence of the "backwardness" of the rural population the ejido model complicated attempts on the part of the government to disburse subsidies and new technologies (Grindle 1986; Schumacher et al. 2019). In 1992, an amendment to the Mexican Constitution (Article 27) removed support for the ejido, legalizing the privatization and sale of these lands.

The legacy of this shift in state support continues to shape the sale and use of land in Mexico decades later. While public investment was diverted away from the ejido system, it was also never "abolished." Thus, Schumacher et al. (2019) observe that "the paradox of the ejido system is that although it is going extinct because it is considered an 'irregular land tenure system' by modern land policies, half of Mexico's territory is still held by ejidos and rural communities" (146). The privatization of ejido land also kickstarted what Schumacher et al. (2019) call an "irreversible urbanization process"–while many poor *ejidatarios* sold their land to move to urban centers to search for work, they also found buyers for their land in urban developers eager for cheap land in peri-urban areas. Schumacher et al. (2019) note that much of this former ejido land in peri-urban areas has been converted into private gated communities, a growing trend for affluent urbanites in response to fears of violence, petty crime, or pollution (Sheinbaum et al. 2010). While the prospect of cheap land is particularly attractive to foreign buyers, the complex tapestry of regulations governing land sales is also difficult to navigate. For example, *ejidatarios* that wish to sell their land must receive formal certification of the land as privately owned, and notify and receive approval from other members of the ejido through a series of assembly hearings. Each of these requirements is

complicated by the existence of the other. As de Janvry et al. (2015) show, the land certification process led to an increase in migration from rural areas (in turn, complicating attempts to conduct relevant stakeholder meetings as required by law).

The same conditions that have led *eijdatarios* to leave rural communities also make it possible for foreign residents to move in. Rural and peri-urban areas are increasingly seen as places to project sustainable imaginaries onto. One ecovillage founder in Morelos described how initially, the town they had founded their community in was off the beaten path–known to adventurous, alternative types, but very disconnected from urban life. Now, the city "was a magnet… now that there's electricity, telephones, and Wi-Fi"; she added "there's a slow drain of people from Mexico City and other parts of Mexico that are suffering a lot from the *narcos* (drug traffickers and cartels) that are coming to the areas... people who would not have survived here in the beginning are coming with their city values."[5] While wealthier urbanites and foreign migrants have increasingly moved to rural areas in Mexico, many former *ejidatarios* (*ejido* owners) have moved to urban centers. As one founder of a community who had studied and worked with rural communities throughout Mexico explained:

> for me it's really clear in the [rural] communities, the fact that communities dissolve, because of all these factors–immigration, of poverty, of the impoverishment of the earth–it leads to a disconnect between the people and their own knowledge, their own story, their own patrimony, because it's not only the knowledge in terms of culture, in terms of cultural manifestations, but it's also knowledge in terms of the management of natural resources, the landscape, of their environment (*entorno*)… their ecological function… I see this constantly...people leave behind their connection to resources (*sus recursos*) and their knowledges, in order to work in other services…tourism, or in the service sector (*economía terciaria*).[6]

These dual trends continue to shape how ecovillage residents and visitors understand their roles and responsibilities to the landscapes they inhabit, which vary depending on perspective; while some residents framed this as an "abandonment" of the countryside, other

[5] Interview, March 4, 2019.
[6] Interview, April 21, 2019.

community residents endeavored to address the issue through their involvement and presence in rural communities.

1.3.2 Apocalypse Now?: Ecovillages as Utopic Imaginaries

"High likelihood of human civilisation coming to end by 2050, report finds." The post in my Facebook news feed, linked to an article by a British outlet, was accompanied by an artist's rendition of the London Bridge being engulfed by stormy waves, the rest of the city skyline noticeably submerged. I clicked over to the profile of the poster, an ecovillage community in formation in the Mexican state of Jalisco. The grim, uncaptioned article was sandwiched between posts about tiny homes constructed of recycled materials, a list of organic gardening tips, and an article about the *chinampas*, an agricultural technique practiced by the Aztecs. These posts were more aspirational than documentary; the community was still in the formation process, though they had recently secured a connection to some land in the hills near Lake Chapala. Still, their concern for the future of the world was a common thread of ecovillage discourse, and hints at the role that perceptions of instability and precarity play in imagining utopias.

Mexico has an interesting way of featuring into foreign end-of-the-world imaginaries. In 2012, Mexico became the center of attention, as some suggested that the end of the current stage of the Maya calendar was evidence of the impending global doom. As the supposedly prophesied date approached, "New Age dreamers, alternative lifestyle gurus, and curious onlookers" descended on the Maya ruins throughout southeastern Mexico, celebrating either the end of the world or the rebirth of a new era of human consciousness (Alper 2012). At the same time, Mexico also figures into the collective imaginary as a space of refuge. The 2004 sci-fi disaster film "Day After Tomorrow," which imagines the effects of extreme climate events on global cities because of human-induced climate change, ends with a scene

depicting Americans fleeing across the border to Mexico illegally. Commentary that life imitated art surfaced a year later, as Texans fled to Mexico in the wake of Hurricane Rita, and again in 2020, when Mexican protesters attempted to block Americans crossing the border into Mexico during the COVID-19 pandemic.[7]

During my fieldwork, two women in different communities used the same event to narrate their first inklings of living in an ecovillage community–the earthquake that devastated Mexico City and the surrounding regions in September 2017. Leana had lived in Mexico City all her life, and told me that her experience of the earthquake and its aftermath were major contributing factors in her decision to leave the city life behind and commit to "rural living." She reflected that she was deeply moved by the mobilization of volunteers, who had organized themselves to clear rubble and search for survivors, and expressed a certain pride at witnessing "such an act of solidarity." On the other hand, the perceived absence of a coordinated government response left her deeply troubled: "the police seemed to be everywhere, except when it came to disasters," she told me. The collapsed buildings–some of which had, on paper, passed the stringent building codes enacted after another deadly earthquake three decades prior–served as frustrating reminders of enduring corruption. "I just felt as if the government didn't care about us, that we can't trust them... what would happen the next time something like this happens?" she remembered thinking. Around this time, she learned about the formation of a small ecovillage forming in a small town in Morelos state–growing her own food or having her own chickens, for example, made her feel a little less helpless about how she would fare in the event of some future disaster.[8]

Another woman who was born in Mexico and owned property in Mexico City and was considering moving to the ecovillage where I met her had expressed similar anxieties.

[7] "Americans Seek Refuge in Mexico," September 23, 2005. Associated Press/CBS News. https://www.cbsnews.com/news/americans-seek-refuge-in-mexico/
[8] Personal Communication, July 1, 2019.

The 2017 earthquake hit just after she had invested a recent inheritance in an apartment in the center of a highly desirable and trendy neighborhood, which she perceived would become a secure source of income over the next few years. “After I ran outside, I was just praying that the building wouldn't fall…everything, all of [my savings], was in that apartment,” she remembered. Although her building didn't sustain any damage, she was still anxious about being in the city during a similar event in the future. “Think about it, there's no phone, the internet's out, there's no public transportation…in Mexico City, if things go bad here, they can go *really* bad.” In contrast, she recalled a time we had both passed at an ecovillage founded by mutual friends, during which a heavy storm knocked out power in the small town nearby. Most places in the town were left without electricity, some for days, including the small house that the ecovillage community maintained there. Even some neighborhoods in the nearby city, the state's capital, were without power for an evening. Some of the residents had joked that the ecovillage site itself–about an hour's drive from the town into the forest–might have been one of the few places in the region with power that night.

Environmental thought has often been accompanied by “apocalyptic predictions and dystopian scenarios” (Garforth 2005, 393), and this (threat of) precarity plays a key role in shaping how sustainable communities are imagined. In the sense that ecovillages are conceptualized as responses to the status quo, such communities are fundamentally a response to precarity–as it is imagined, anticipated, or directly experienced. As Litfin (2016) and others have noted, ecovillages are conceptually founded on concerns about the livability of the planet in coming generations. In this respect, ecovillages are engaged in designing the possibility of human futures, envisioned as refuges that hedge against growing threats posed by global capitalism, climate change, and a host of interrelated and concomitant concerns.

Similarly, the anticipation of future conflict–particularly, over resources like clean water, land, and food–were sources of concerns for several I spoke with who chose to

relocate or found ecovillages. Jens, for example, had originally purchased land in Veracruz (which later became the community of Rancho Bosque) in the early 1980s, with the underlying goal of developing it into an area where he and his then-wife could live comfortably. Having worked in agricultural development projects in Mexico for decades, Jens described himself as increasingly preoccupied with what he described as Mexico's demographic explosion–the population doubling every few decades. At the same time, Mexico had transformed from being "a self-sufficient country" to "based, on the whole, on exports from outside countries."[9] Such a scenario, in Jens' perspective, was likely to end in disaster. At the same time, it was a disaster which he could prepare for by purchasing land: "I had a precondition...that if we want to stay in Mexico, but don't want to suffer a likely civil war because of the lack of food in 20 years or so, we needed some land in order to be '*autosustentable*' (self-sustainable), and learn about the relevant techniques to the areas where we wanted to live".[10] Jens' comments reflected the urgency with which alternatives–including ecovillages–are seen as necessary, as well as how fraught concepts like "overpopulation" or "sustainability" overlap in the production of ecovillage narratives.

Some residents understood ecovillages as spaces of refuge from various impending social crises. Tierra Madre, a community founded in order to "create space for women," was articulated as a response to broader society, which Tierra Madre residents understood to be fundamentally shaped by the patriarchy and toxic masculinity (*machismo*). My interview with Jens recalled one of my first visits to a Jalisco ecovillage-in-formation in 2014, and my brief encounter with a small group of visitors for Canada. The small group of four individuals had been camping on the land for some time, but mostly kept to themselves, and ate separately from the rest of us the first night I arrived. In the morning, they were gone. When I

[9] Interview with Jens, February 19, 2019.
[10] Interview with Jens, February 19, 2019.

asked if the departure was planned, the owners of the land threw up their hands and sighed, telling me that the group had announced their intentions to form a "community within a community" on the land, which left both parties unsatisfied after the ensuing discussion. The experience was detailed in one landowner's memoirist account of their experience developing the community: "the group had left Canada convinced that the zombie apocalypse, or something close to it, was about to befall the U.S. and their fair land. Since leaving Canada, bound for a planned eco-village startup... the group had been informed that the village was no longer going to be happening" (Gair 2018, 121). After staying in the community for approximately a week, they informed the owners that they had "severed all ties with [their] lives in Canada except for a group of others who'll be following them down here," believing that "the collapse of North American society is imminent, and the borders will be closing soon." When the owners of the land expressed skepticism about their plan, the group vacated the campsite overnight. Both of these instances reflected how experiences of precarity and danger–as they are experienced, but also as they are anticipated and imagined–can be powerful motivators influencing the growing emergence of projects like ecovillage communities. Moreover, these stories also reveal the uneven social realities and privileges of prospective ecovillage residents to orchestrate "escapes" from the status quo, a theme which I discuss in the following section.

1.3.3 No Place Like Home: Expatriate Imaginaries in Mexico

Mexico has become a gathering space for sustainability-minded foreigners, who see in Mexico an adventurous retirement space at less hassle or cost for a comparable lifestyle in the United States. This ability to live sustained periods abroad is permitted by the sociopolitical contexts that residents occupy. The proliferation of areas developed for and exclusively populated by foreigners in Mexico has been encouraged in part by the

comparative affordability of land, labor (particularly for trades like construction), food, and other necessities. Anna, a woman in her early 60s that was one of the first residents of an ecovillage community, echoed a sensibility I heard from many foreign-born ecovillage residents: "I couldn't afford to do what I do here, back there [in the United States]".[11]

While not all ecovillages in Mexico are founded by "expats," Americans, Canadians, and Europeans have played outsized roles in shaping the communities that have emerged there over the last decade. This is in part due to a broader trend in Mexico of what Benson and O'Reilly (2009) call "lifestyle migration," by which "relatively affluent individuals, moving either part-time or full-time, permanently or temporarily, to places which, for various reasons, signify for the migrants something loosely defined as quality of life" (621). These circulations of mobility are, of course, uneven–as Benson (2012) emphasizes, the ability for "imagination" to inform "action" is heavily influenced not only by collective imaginaries, but also hinges on broader structural conditions–namely, wealth and access to social capital.[12] Lifestyle migration to Mexico is made possible through globalization (Benson and O'Reilly 2009; Benson 2012), and accelerated even further following the adoption of the North American Free Trade Agreement (NAFTA) (Dürr 2012).

Mexico has long figured more broadly into the expat collective imaginary–viewed as more "laid back" and less expensive, many individuals come to Mexico from Canada, the United States, or Europe with pensions or other income that affords them a relatively higher standard of living than in their countries of origin (Sunil et al. 2007). This interest has been further sustained by the relative ease by which citizens of particular countries can retain the benefits of their citizenship while residing in Mexico a good part of the year (often, without

[11] Interview, Eco Rancho, May 23, 2019.
[12] See also D'Andrea 2006

formal authorization).[13] The term "snowbird" has even entered the popular lexicon to refer to Canadians who "fly south" to Mexico in the winters, returning to Canada during the summer (Bantman-Masum 2015), thus allowing them to maintain coverage by Canada's nationalized healthcare system.

In addition to being a draw for local tourists from nearby cities, the area around Lake Chapala has been experiencing a boom in development in community housing, particularly for retired foreigners or those looking to "age in place" (Truly 2002; Sunil et al. 2007). A nearby international airport, proximity to other tourist destinations in the state, such as coastal Puerto Vallarta or Sayulita, and the growing popularity of "expat-centric" communities elsewhere have helped to spur on the market for community living options for foreigners in the area. In this respect, the framing of living sustainably is rooted in a view of place that emphasizes affordability and access, especially for those with resources or networks of support that extend beyond Mexican borders. As another resident of the Eco Rancho community mentioned to me simply, "A lot of Americans come to Mexico to retire because they can't afford to retire there [in the United States]". The high cost of land, as well as other regulatory barriers–such as zoning regulations or building codes–were cited by several as reasons why other countries were undesirable for developing ecovillage communities, compared to Mexico.

When pressed on what the concept of "sustainability" meant to foreign residents of ecovillage communities in Mexico, answers tended to be framed around a reduction in the consumption of resources: particularly, energy or electricity, water, and fuel. Speaking with an older couple who had moved to a "sustainable co-housing" community outside of Jalisco from the United States illustrated this trend:

[13] The United States, Mexico, and many European countries are permitted to stay in Mexico for approximately 6 months out of the year without a visa; however, there are no limits to how long one must remain outside the country before re-entering. "Border runs" to "reset the clock" on Mexican tourist visas are a well-known loophole, and allow many to stay in the country for long periods of time.

> Olea: You've mentioned a lot of different factors related to this idea of sustainability… infrastructure, growing organic vegetables…if you had to choose, which one of these elements was most important to you at the beginning?
> C: For coming here to [the community]?
> T: The swimming pool!
> C: The swimming pool *laughs*.
> T: You mean the actual, physical elements that are here around us?
> Olea: Sure, I guess I'm wondering, when you say "sustainability," what does that mean to you?
> C: Being totally solar.
> T: Right. No electricity bills.[14]

In the exchanges I had with individuals for whom this was the case, "sustainability" was often construed as a commentary on their previous lived experiences in other countries; that is to say, life in America, Canada, or elsewhere was inherently "not sustainable," whereas life in Mexico presented an opportunity to change this. Living in a community that is sustainable–in the sense of recycling resources, gathering solar energy, and growing organic food–became affordable in Mexico in a way that it could not in their home countries. Such residents are not only limited to the more traditional picture of the affluent expat–often older and retired (Dürr, 2012)–but also a growing class of the "hypermobile" and location-independent, such as "global nomads" (D'Andrea 2006; O'Regan 2008). Ecovillage communities and regenerative agriculture projects offer the opportunity to live out idealized alternative lifestyles characterized by "autonomy, self-expression, and experimentation" (D'Andrea, 2006, 98), and often become temporary or longer-term (but rarely permanent) homes for circuits of visitors and temporary residents "seeking the simple life."

The importance of rural spaces that are still connected–to broader circulations of people, or bigger cities–reflects a dual framing of rural spaces as places of refuge and places of connection. In this understanding, the ecovillage becomes both a kind of place that has the potential to support or sustain a person or people (that is, with a minimal reliance on external

[14] Interview with Resident, Eco Rancho, May 23, 2019.

inputs), but also one that enables residents to maintain connections to the lifestyles that they had before (D'Andrea 2006). Just as rural areas can be places to which they can escape, they can also be places in which to construct lifestyles that preclude the perceived negative aspects of the lifestyles they are leaving behind. Two prospective ecovillage founders originally from the United States explained they had initially purchased land in Mexico "just as a way to get out of the New England winters, and get a little house by the beach or something." [15] As they began to become more interested in the use of solar energy and the practice of permaculture, their new property began to take on a new significance:

> When we stumbled into this property we didn't have a clue about sustainability, permaculture, none of that... about the time we really settled in and started making the campground we realized that we were passionate about sustainability and getting more and more tuned into where the world was heading and just figured it...We just didn't want to be participating in that... we keep hearing about people that feel that life is going to change as we know it, as Americans and Canadians and you know, sort of "First World". It appears to be at least with the groups that we hang with, this sense that it's not going to keep going that way. And that people can have themselves prepared to grow their own food, alternative forms of fuel... homesteading.[16]

Their observation reflects how the performance of sustainability can also articulate to broader themes of class and power; namely, the power to seek refuge from the environmental and social consequences of economic systems from which some ecovillage residents had benefited.

The historical conditions of land tenure in Mexico and the uneven mobilities of different ecovillage residents and visitors produces a context where sustainable livelihoods are not only put into practice, but contested. Residents are guided by similar kinds of concerns for themselves and "nature" writ large, provoked by an awareness of multiple overlapping environmental and social issues. These individual perspectives, however, are

[15] Interview, October 18, 2014
[16] *Ibid.*

informed by residents' own expectations, forms of expertise (or lack thereof), and ways of understanding and negotiating the concept of "sustainability" (Wittmayer, 2019) In this respect, exploring the emergence of ecovillages in Mexico provides fertile ground for understanding how these divergent understandings and concomitant practices of sustainability take root in places where they are transported and cultivate.

1.4 Guide to the Chapters

In chapters 2 and 3, I present the theoretical framework and methodological approaches that inform the rest of this research. Each section of this analysis is composed by a pair of chapters, following the assemblage processes of gathering (chapters 4 and 5), coherence (chapters 6 and 7), and dispersion (chapters 8 and 9). While the first of each chapter pair explores each theme more generally, drawing on data from across research sites, the second in the pair takes a deeper dive into one of the three key communities, highlighting different kinds of interspecies relationships to build on and complicate analysis developed in the previous chapter.

In chapter 4, I expand on the concept of "Gathering," drawing on ethnographic examples across all research sites to describe how ecovillage communities bring together different actors (both human and more-than-human), knowledge, and practices. In chapter 5, I apply the analytical framework developed in the previous chapter to the community of Tierra Madre, showing gathering processes as fundamentally about exclusion as well as inclusion. Chapters 6 and 7 move towards an exploration of "coherence-making," or the processes by which knowledge and place are stitched together and assembled into socioecological systems. While chapter 6 draws on ethnographic examples from across research sites, chapter 7 focuses on the community of Aldea Ceiba to develop an understanding of more-than-human forms of "coherence-making," focusing on the entanglements of cultivated bee species, both native and introduced. Here, I argue, sustainability practices always emerge in relation to

embedded practices of care, involving localized practices of "making sense" of multispecies relationships.

Finally in chapters 8 and 9, I explore the ways that ecovillages, as more-than-human assemblages, might be undone. Using death as an analytical lens, chapter 8 discusses how different communities reckon with the concept in its various shades: how it is mobilized in the production of "regenerative" spaces, but also how ecovillage communities themselves might "die." Chapter 9, in turn, takes up the management of manure at Rancho Bosque–the "ecovillage as shitscape"–as a way of exploring the generative possibilities that arise from gaps between knowledge and place, vision and reality. Finally, I conclude with a discussion of the contributions of this research to conceptions of more-than-human sustainabilities, as well as directions for future research.

Chapter 2. Theory: More-Than-Human Assemblages, Care, and Sustainable Places

In this chapter, I present and explain a theoretical framework for understanding how sustainability narratives are collectively constructed, reproduced, or amended in ecovillage settings. If ecovillages are understood as experimental endeavors to live with and within local ecologies, this suggests that the process by which ecovillagers learn *to do* this is related to the development of their relationships with more-than-human others over time. However, individual communities prioritize differing values and sets of practices in designing systems that they understand to be "self-sustainable" (*autosustentabilidad*), suggesting that practicing sustainability is a deeply contingent process oriented towards potentially nebulous ends. Rather than developing a definition or rubric of sustainability for assessing "whether or not" ecovillage communities are sustainable, I instead focus on the *process* by which ecovillage residents navigate the kinds of challenges that the goal of "self-sustainability" presents. This process, as I will argue, is deeply situated in the human and more-than-human relationalities particular to each community, and made legible through practices of care.

Engaging with discussions in environmental anthropology, geography, and multispecies studies, I first develop an understanding of ecovillage communities as entities shaped by both human and more-than-human actors, or "more-than-human assemblages" (Lendvay 2021). I then theorize more-than-human care as an analytical lens to explore entanglements of knowledge and place, highlighting how understandings of sustainability are transformed in their enactment. Finally, I draw on threads of assemblage theory (DeLanda 2006; Anderson and McFarlane 2011) to explore how these entanglements are shaped, transformed and unmade in ecovillage daily life. In understanding care practices as a mediating process linking knowledge and place, I suggest that tracing these patterns of care can help to reveal how ecovillage residents navigate the gaps between sustainable visions and

embodied realities.

2.1 Theorizing the More-Than-Human

The relationship between "nature" and "culture" has remained a fundamental question of the discipline of anthropology (Descola and Pálsson 1996). In the first half of the 20th century, Julian Steward coined the "cultural ecology" approach to explore and explain the ways that cultural groups were influenced and shaped by their relationships with the surrounding environment (Steward 1968). The structuralist anthropologists that followed (e.g., Lévi-Strauss, among others) argued that cultural variance derived from differences in underlying "representational schemata," through which experiences and external environment were filtered (Ingold 2000). These theoretical approaches tended to centralize the human experience, examining how human sociality is rooted in and shaped by the natural world (Aisher and Damodaran 2016), presumed to be distinct and separate from the domain of culture.

In recent years, however, there has been greater attention to the role of "more-than-human" others as social beings in their own right, rather than merely part of the backdrop ("the environment") on which human social lives are projected (Gruen 2009; Pearson 2015; Russell 2019). These understandings were informed by debates in disciplines such as anthropology, science and technology studies (STS) and critical animal studies, which afforded animals, plants, and a multitude of other non-human "others" their own fields of social relationships and agency. In this respect, Actor Network Theory (ANT) was instrumental in re-conceptualizing the roles of nonhumans in shifting fields of social relationships; rather than being the "hapless bearers of symbolic projection" (Latour 2005, 10), non-human "actants" could instead exert considerable influence on human social lives. As Latour (1996, 2005) has suggested, this artificial bifurcation between humans (chiefly associated with the domain of "culture") and nonhumans (associated with the domain of

"nature") has been one of the key assumptions underpinning contemporary discussions of modernity as a human social condition. Breaking down this reductive dichotomy has revealed in part the complicated ways that humans and nonhumans are implicated in the construction of the other, or indeed are inseparable from one another–mixtures referred to by Latour (1996) as "naturecultural hybrids" or by Haraway (2003, 2006) as "cyborgs" (Jones and Cloke 2008; Lorimer 2012).

The politics of categorizing and naming "non-humans" in relation to humans has inspired considerable debate, and the rationale for using certain terminology bears mentioning The number of terms available to describe such beings– "non-human," "other-than-human" (Lien and Pálsson 2019), "more-than-human" (Whatmore 2006; Tsing 2013), and more– reflect the ubiquity of post-humanistic discourse within anthropology and geography, as well as the particularities of each discipline's epistemic grounding. While each term signifies a broadly encompassing, collective terms for other beings, they have various shades of meaning that are implicated in theoretical discourse. "Other-than-human," for example, captures a sense of alterity in reference *to* humans (and hence, possibly dampening the impact of a word that seeks to inspire "de-centering humanness" as a praxis). Other scholars have challenged the appropriateness of the "nonhuman" label, for instances, calling attention to the ways that negation of human-ness (e.g., "sub-human") have been deployed within racist or species-ist dialogues (Kirksey 2017). For the sake of consistency, in this dissertation I use "more-than-human" because of its generalizability to both living and nonliving entities, as well as for its conceptual de-centering of humans as a key focus of social inquiry.

Multispecies ethnographic approaches take seriously this prospect that "human nature is an interspecies relationship" (Haraway 2006, 2008; Kirksey and Helmreich 2010; Tsing 2012). Eduardo Kohn's framing of non-human others as "selves," capable of both "being

represented" as well as "representing" themselves, provided a lens through which to re-imagine traditional disciplinary boundaries and instead work towards an "anthropology of life" (Kohn 2007). "Anthropology of life" approaches focus on how humans "become with" other species (Haraway 2008), and on the semiotic "synergy of organism and environment" rather on the dividing line between nature and culture (Ingold 2000, 44). If more-than-human actors are understood to have agency, then what might we gain, as Phillips and Robertson (2020) ask, from thinking "beyond the human register to appreciate chickens, bees, and other non-humans as place-makers, as inhabitants caught in and formulating the negotiations and trajectories" of places" (500)?

Ongoing work in critical animal studies and geography have called attention to the ways that more-than-human others are not passive inhabitants, but rather active participants, in their respective environments (Whatmore 2006; Dowling et al. 2016). As Lewontin (1983) points out, organisms do not so much "adapt" to their environments as much as they "construct them out of bits and pieces of the external world" (280). Laland and O'Brien (2010), for instance, point out how other species are engaged in "niche construction," an ecological theory which emphasizes that "in modifying their own world, organisms frequently modify the environments of other organisms that share those environments" (305). Day et al. (2003) remark that even the process of photosynthesis might be considered a broad example of niche construction, in the sense that plants have drastically altered the composition of the earth's atmosphere–and in so doing, making the environment more hospitable to their forms of life. These perspectives loop back to and complicate the understanding of ecological assemblage as a group of species that merely happen to "co-occur" in space. Instead, such a perspective highlights the agential roles of more-than-human others in determining which parts of the world constitute their environment, just as humans do (Lewontin 1982).

In this respect, it is important to point out that the ways in which more-than-human others construct and engage with their environments are not always intelligible or legible to the human eye. Cornips and van den Hegel (2021), for instance, relate the story of a Dutch milking cow named Mientje, who adopted the seemingly innocuous habit of "licking and/or biting" of non-food objects such as door handles. Far from being "inconsequential or meaningless," the action prefaced a scenario where Mientje opened the bolt to her herd's enclosure, "leading the herd to the barn in the expectation of finding some snacks and by shitting the barn when they find nothing there" (186), which in turn prompted a human response (i.e., cleaning the barn). Attunement to these more-than-human forms of communication and interaction gesture to the unseen and unsensed actions of other beings (Phillips and Robertson 2020) that nevertheless inform and influence human sociality.

Attention to more-than-human subjects in anthropology (and in the social sciences more broadly) has grown substantially in recent years, and the complexity and richness of these discussions cannot be done justice within the scope of this chapter. There are, however, two primary themes from these discussions that anchor the analytical frame of this dissertation. First, an understanding of ecovillages as assemblages of human and more-than human beings requires a "de-centering" of the human as the sole focus of social research (e.g., Ogden 2013). As Tsing (2012) argues, "human exceptionalism blinds us" in that it "direct[s] questions to the human control of nature, on the one hand, or human impact on nature, on the other, rather than to species interdependence" (144). Reframing the locus of inquiry to include both humans and more-than-human life with which they interact is crucial for dispelling the narrative of human supremacy, and instead allows for the telling of other kinds of stories–for example, instances where non-humans challenge or resist human designs for them (Pearson 2015).

Secondly, this research is attuned to the processual and unfolding nature of human and more-than-human relationships. Following Ingold (2011), I agree that "organic life...is active rather than reactive," and involves "the creative unfolding of an entire field of relationships within which beings emerge and take on the particular forms they do, each in relation to others" (19). Such an orientation helps to understand ecovillages as emergent products of human and more-than-human relationships, rather than as enactments of human plans projected onto particular ecological contexts or landscapes. In doing so I locate the formation and concretion of sustainable practice within a more-than-human relational dynamic, characterized by "everyday engagement," rather than "disembodied contemplation" (Nash 2005, 68).

Below, I discuss how deeper engagements with assemblage theory bring together both perspectives ("decentering" the human, and accounting for the processual dimension of human and more-than-human relationships) into a cohesive conceptual framework. Beginning with a discussion of how assemblage and assembly processes have been theorized, I work towards an understanding of ecovillages as "more-than-human assemblages" that are shaped by entanglements between knowledge and place.

2.2 Ecovillages as More-Than-Human Assemblages

"Assemblage" is a concept germane to both the biological and social sciences, sharing semblances of meaning but differing substantially in how they are rendered as units of analysis. Within the biological sciences, "assemblage" refers to a co-occurrence of species in time and place; unlike ecological "communities," assemblages generally refer to species that are taxonomically related (Fauth et al. 1996). Over time, ecological theory has shifted from understanding species groupings as fixed sub-units of broader systems, and instead to the processes by which different species communities "are formed or assembled over time from a regional species pool" (Booth and Swanton 2002).

The discipline of multispecies studies has unsettled some of the ways that the language of ecological systems thinking have been imported into thinking about more-than-human relationality. As Despret and Meuret (2016) reflect, the concept of "ecosystem" is suffused with ideas about equilibrium and balances, which are themselves cultural products. While they argue these concepts are helpful for structuring ideas about relations, but are inherently limited in their applicability: "these interconnected lives, each of them having their ever-evolving requirements and habits, have nothing to do with the balance of nature, a machine analogy" (26). Similarly, Eduardo Kohn draws on the work of Jakob von Uexküll to highlight that "ecological relationships are not the product of mechanical cause-and-effect interactions among organisms as objects," but instead the interaction between the "phenomenal worlds" of particular beings (Kohn 2007). Rather than reifying or replacing mechanistic models of interspecies functionality, importing and applying social theory provides an opportunity for framing more-than-human others as agential beings whose actions are not reducible to mere cause and effect.

An "assemblage" describes a collection of heterogeneous elements: "human and non-human, organic and inorganic, technical and natural" (Anderson and McFarlane 2011, 124), which are fit together through various relations into temporarily stable "social wholes" (DeLanda 2016, 110).[17] Assemblages are not only conceptual entities, describing a particular grouping of entities or objects, but also refers to the *process* through which heterogeneous elements are associated with one another (Li, 2007; Anderson and MacFarlane 2011). As Li (2007) discusses, "assemblage links directly to a practice, to assemble... Assemblage flags agency, the hard work required to draw heterogeneous elements together, forge connections between them and sustain these connections in the face of tension. It invites analysis of how

[17] This understanding of assemblage theory draws on and responds to Deleuze and Guattari's (1987) "A Thousand Plateaus."

the elements of an assemblage might–or might not–be made to cohere" (264). Key to this understanding of assemblage theory is the question of temporality–in this respect, assemblage "therefore involves an orientation to assembling and disassembling, as relations form, take hold and endure, but they also may change or be disrupted" (Anderson and McFarlane 2011, 125). In the context of ecovillages, such an analytic frame highlights the underlying both agentive and contextual factors that coalesce in the process of community formation.

Finally, the concept of "assemblage" provides the language for thinking through how individual ecovillages are connected within broader flows of capital, labour, knowledge, and ideas about sustainable livelihoods. Such a "global assemblage perspective" (Collier and Ong 2005) recognizes the ways that places are shaped by forces and flows beyond arbitrary boundaries (Gupta and Ferguson 1992; Appadurai 1996), and allows for a kind of multi-scalar thinking that is "without any presumed hegemony of scale" (Dovey 2020, 22). In this sense, as Dovey (2020) argues, assemblage thinking is "best understood as the search for the general in the particular," understanding that "particular" instances are not evidence of a "general" rule, but instead "what becomes of the rule emerges in part from the interactions of particulars" (22).

Intensifying currents of globalization hasten the need to critically interrogate "assumed isomorphs of space, place, and culture" (Gupta and Ferguson 1997, 34), and instead understand how places are constructed through multi-scalar circulations of human and more-than-human others. As Collier and Ong (2005) contend, "as global forms are articulated in specific situations–or territorialized in assemblages–they define new material, collective, and discursive relationships" (4). Escobar (2001) observes that places are constructed through a kaleidoscope of intersecting processes and actors, "involving the human, biophysical non-human, and machinic worlds operating at many scales, from the

microbiological to the transnational" (60). Understanding "places" thusly–through a lens that privileges a "politics of scale" (Escobar, 2001)–is complicated further by the collage of nonhuman lives, operating by their own timescales, life cycle patterns, and mobilities, which come together to produce their own forms of sociality.

The relationship between ecovillages and the places in which they are located has frequently been described, to varying degrees, as a network of "islands": self-contained communities that are at the same time connected to one another through ideological and practical similarities (von Lüpke 2012; Andreas 2013; Dawson 2013). Occasionally likened to "islands of sustainability" (Andreas 2013; Temesgen 2020), ecovillages recall an imagination of the utopian enclave, existing outside of or in opposition to the mainstream. As a kind of "intentional" community, the name ecovillage signals further that this social distance is both a conscious and deliberate rejection of societal patterns, such as capitalist consumerism or conventional agriculture. Meijering et al. (2007) argues that this politics of exclusion goes both ways: that ecovillages are both "excluded by the mainstream" and "actively withdraw from it at the same time" (43). This understanding of the ecovillage "model" suggests that socioecological systems might be bundled together in particular ways to sustain a social presence outside of society at large, a vision of sustainability that requires stasis and boundedness.

But no ecovillage is an island, in the sense that each of these communities are inextricably entangled within fields of relations that extend beyond their geographic boundaries. Ecovillages are rarely founded in environments that are truly isolated; even in rural settings, other communities are generally not far away. Newly founded ecovillages often rely heavily on the presence of visitors or foreign volunteers as both a source of labor and income, circulations which have been greatly facilitated by the internet. Dawson (2013) argues that as relationships between ecovillages and other neighboring communities has

improved, “the many social, economic, and ecological experiments that ecovillages have undertaken have spilled out of the confines of ecovillages themselves to flavor and transform their surrounding bioregions” (Dawson 2013, 217). Sometimes, these connections reflect patterns of mutual aid, care, and solidarity with other organizations and actors that are similarly oriented towards sustainability or environmental and social justice (LeVasseur 2013). These external connections further trouble the durability of sustainability imaginaries, and prompt localized practices of negotiation between the competing interests of a multiplicity of actors.

In summary, assemblages are more than the heterogeneous elements and actors they are composed of, but also alludes to the processes by which these elements are brought together and made to cohere. In this sense, assemblage provide a common language for understanding ecovillage communities on both a conceptual and material register: how understandings of sustainability are embodied and made manifest through constellations of human and more-than-human others, but also how these assembled entities and beings shape and transform understandings about what is meant by “sustainable community.” Here, I turn my focus to what I understand as entanglements of place (or the material/contextual) and knowledge (as conceptual/particular), building towards an understanding of how these connections produce competing or overlapping visions of sustainability. Finally, I propose practices of more-than-human care as a lens for tracing how place-knowledge entanglements unfold over time.

2.3 Understanding Knowledge-Place Entanglements Through Care

Ecological knowledge, which Barth (2002) defines simply as “what a person employs to interpret and act on the world,” has often been theorized through its relationship with place. Environmental knowledge is place-based, Ingold (2000) argues, not because it is

inscribed or "pinned on" features in nature that might then be "decoded," but because it emerges from experience, a gradual process of revelation to a novitiate (see also Rival 2012). For Ingold (2003), knowledge is "indistinguishable from the life-activity" of an organism or person in their environment, "consisting of skills, sensitivities, and orientations that have developed" from encounters with "objects or features of the world.... plants and fungi, waterholes and hills" (Ingold 2000, 21). Similarly, Nazarea (2006) observes that "local knowledge is experiential and embodied in everyday practice," and is not formulated or inscribed as a set of rules, or "formulated apart from what makes sense from living day to day in one's environment" (2006).

In this regard, it might be said that knowledge "comes into being" (Raedeke and Rikoon 1997, Riley 2008) through experiences in place and relationships with more-than-human others (Pitt 2015, Krzywoszynska 2016, Krzywoszynska 2019). Place refers to "articulated moments in networks of social relationships" (Massey 1991), composed of assemblages of human and more-than-human others that are "always becoming and never finished" (Pred 1984, Dovey 2010, Dovey 2020). With this understanding of place as ephemeral "bundles" of actors and relations, Pierce et al. (2011) suggest that places are made as people "iteratively create and recreate the experienced geographies in which they live" (Pierce et al. 2011). Place-making involves a mediation between the symbolic and the material, involving "the assigning, through interaction and other forms of connectivity, of social meanings to physical (and increasingly digital) space" (Cornips and van den Hengel 2021, 186). As Lombard (2014) points out, "places do not have single, essential identities; rather, there are multiple identities for any given place, which may be a source of richness but also conflict" (12).

While community may certainly exist outside of or absent a shared physical space (Massey 1991), a shared sense of place can also help to cement understandings of solidarity

and shared identity (Tuan 1974, Pred 1984, Gray 2000, Martin 2003, Wise 2015). As Anna Tsing (2012) writes, “familiar places are the beginning of appreciation for multi-species interactions" (142). Like Tsing's (2015) mushroom foragers, ecovillage residents come to know about other beings through their experiences in place; not only “about ecological relationships in general, but also about the stochastic natural histories through which particular species and species associations happened to flourish in particular spots” (142). In this way, shepherds, gardeners, beekeepers, and chefs become attuned to a host of multispecies relationships as it pertains to their work, and in doing so, come to inhabit partial and situated modes of expertise.

Understanding knowledge as “place-based,” however, must be qualified so as not to fall into familiar epistemological traps. As Raedeke and Rikoon (1997) argue, forms of “place-based knowledge,” described as “local, indigenous, or traditional,”[18] have historically been held up against “Western, scientific, instrumentally rational knowledge” (Raedeke and Rikoon 1997, 147), understood by contrast to be place-independent. This false dichotomy between “place-based” indigenous knowledge and “place-less” scientific knowledge reproduces social inequalities by relegating indigenous knowledge to particular ecological or social contexts, failing to treat indigenous forms of knowledge as adaptable, lively entities in and of themselves (Agrawal 1995). Furthermore, as Lorimer and Driessen (2014) have pointed out, the idea of scientific knowledge as “placeless,” and by extension applicable everywhere, is illusory: “a multitude of laboratory ethnographies have demonstrated that labs are much like field sites comprising experiments that are 'tentative, local and uncertain' (170). In order to account for these nuances, I follow Tsouvalis et al. (2000) in seeking to avoid “essentialist conceptions of knowledge as indicated by the prefixes ‘expert’, ‘lay’, or ‘local,’” and instead turn attention to the “complex processes and power relations that give rise to

[18] These are all terms which, as Raedeke and Rikoon (1997) point out, have different connotations.

differential knowledge production" (911).

Asking how ecovillage residents construct and negotiate sustainable visions speaks to a broader challenge posed by life in the Anthropocene: the disappearance of diverse forms of biocultural knowledge, and the stakes implied by their disappearance(s) (Ingold 2011). While ecovillages might be understood as a branch of broader "back to land" movements, for many ecovillage residents this implies less of a "going back to" and more of a new arrival. Many ecovillage residents come from cities, both elsewhere in Mexico or in other countries, some with few skills in growing food, constructing homes, or operating within the contexts in which they found and reside. If it is understood that ecological knowledge does not emerge spontaneously (as if it were encoded in the landscape and could be translated), how this knowledge is gained has significant bearing on what kinds of futures are being pursued. As Ingold (2011) asks, "what happens in settler environments where we lack this capacity to have things shown to us?" In attempting to design and enact sustainable communities, ecovillage residents must grapple with assembling new forms of knowledge and practices of care, guided by the more-than-human others that they care for.

Gardens, pastures, food forests, and other agricultural spaces common to ecovillage communities are good venues for following practices of more-than-human care. Drawing on Ingold's work, Pitt (2015) has discussed gardens as places of knowledge production, influenced by an ongoing process of "showing and being shown." This process is iterative and unfolding; as Miller (2019) writes, "knowledge is not straightforwardly passed down through verbal instructions from experts who know to novices that do not know"; instead, it is formed through embodied relationships with the beings that residents care for (Ingold 2003, Head and Atchison 2009, Krzywoszynska 2016). Tracing these emergent practices of more-than-human care reveals the co-constructive nature of ecological knowledge and experiences of place.

Building an understanding of how new "ways of knowing" emerge from experiences in place helps to account for the broad range of practices employed by different ecovillage communities in constructing sustainable futures. Different strands of regenerative agriculture practice–permaculture, agroecology, or biodynamic agriculture, for example–represent distinct ways of articulating meaning or "making sense" of agroecosystems (Tsouvalis et al., 2000), reflecting how alternative agricultures are discursive and respond to social, political, and environmental factors experienced by farmers (Sumberg et al., 2013; Sumberg, 2017; Münster, 2018; Kearnes and Rickards, 2020). These emergent sets of practices reflect a "hybridization of regenerative agriculture," or attempts to reconcile "established frameworks of agronomic expertise" with particular "aesthetic representations and embodied experiences" of landscapes (Kearnes and Rickards 2020, 72). This "hybrid knowledge work" in turn requires "ethical and aesthetic improvisations" in navigating and stitching together current and past experience (Kearnes and Rickards 2020, 73). In this way, experiences in place directly inform the production of ecological knowledge.

Ecovillages, like other agricultural contexts, are environments that invite and even demand relationships of care for other forms of life. In ecovillages, where the work of attending to complex entanglements of multispecies relationships is divided amongst many people, these fields of relationships with more-than-human others are situated and partial (Haraway 1988). Taking care of sheep, for example, involves developing an understanding of what other beings that sheep interact with in their environment: which grasses sheep prefer and where they grow, or attunement to the presence of parasites or other harmful creatures. Through these lines of connection and intimacy, ecovillagers are drawn into relationships with more-than-human others that are consequential to those they intend to cultivate, both for what they represent and what they provide.

As communities develop, the configurations of ecovillage landscapes permit or inhibit

certain ways of relating with more-than-human others. Agricultural landscapes reflect both the "accumulation of embodied practices in the past and present," but also the "future imaginaries" of farmers (Aistara 2018, 86). In positioning themselves against conventional agriculture, practitioners of alternative agriculture (including ecovillage residents) transform inherited landscapes through practice, "embedding personal and cultural memories into their land" (Aistara 2018, 85). Riley (2008) argues that in developing patterns of agricultural practice, farmers actively construct imagined realities in relation to their present environment, negotiating expertise or prior experience with grounded experiences of their community. These transformations, in turn, yield new potentialities for relating; for example, "as a foundation for forming networks with other farmers and other living beings in the landscape" (Aistara 2018, 85).

I propose that a critical focus on care–understood here as an "alignment of interest and practice" (Hartigan 2017, xiii)–is key to understanding the entanglements of place and knowledge, as reflected through human and more-than-human relationships. Care, argues Maria Puig de la Bellacasa, implies more than the "concrete practices of maintenance" but also "different relationalities, issues, and practices in different settings" (2017, 7; see also Wanderer 2018). "Care" is not always conceptualized around stable attributes such as use value, nor does lack of care imply neglect or abnegation. Caring can be place and context specific, depending on the kinds of frames through which more-than-human others are viewed (Hartigan 2017, Wanderer 2018). As Wanderer (2018) observes, different practices of care reflect latent values and visions for the world: "divergent imagined futures for human biologies and lives" (653). In this sense, following practices of care and in all its shades and tones provides a way for understanding the different kinds of "values, norms, and principles marshaled by people as they act to make the world a better place" (Rival 2017, 184) and how they are put into practice (even as they diverge from or contradict other visions). Below, I

integrate this understanding of care with threads of assemblage theory, building a framework that informs the structure of the analytical chapters that follow.

2.4 Gathering, Coherence, Dispersion: Tracing Practices of Care

This chapter has framed the ecovillage as an object for critical analysis from both human and more-than-human vantage points. In the following section, I argue that tracing entanglements of knowledge and place is possible through attention to the relationships that ecovillage residents have with the more-than-human beings that they care for and live with. To structure this discussion, I draw on Anderson and McFarlane's (2011) understanding of assemblages as forms shaped by interrelated processes of gathering, coherence, and dispersion. Place and space are important factors in this process because the nature of the relationships between entities changes depending on how they converge and are made to fit into networked social forms; citing the work of Tania Murray Li (2007, 265), Anderson and McFarlane (2011) argue that "the shape [of the assemblage] shifts…according to place and the angle of vision" (125). Thus, assemblages are never static, but rather are in a perpetual state of emergence and potential transformation into something new (Gan and Tsing 2018). In this section, I develop an understanding of each of these strands of assemblage theory as conceptual guideposts, and discuss how each of these "stages" reveal different kinds of place-knowledge entanglements expressed through care.

2.4.1 Gathering

Gathering, as understood here, refers to the ways that different species, people, practices, and knowledge are brought together in such a way that they might be considered constituent elements of a broader whole (i.e., a community). The word "gathering" connotes the dual meanings of collection and self-assembly–the act of *coming to be* in co-presence

with others. Without specific reference to the direction of the action or underlying intent, it leaves deliberately fuzzy whether one is doing the gathering, being gathered, or gathering themselves. In this ambiguity, the concept of gathering provides different ways for considering how different forms of agency are engaged in the creation of ecovillage assemblages. In one respect, gathering suggests a distinctly human phenomenon: a creative act formed by deliberative engagement with one's environment (Ingold, 2000); which proceeds "through individual people's (conscious or unconscious) acts of selecting or choosing raw materials, or elements, which comprise places in their experiences" (Pierce et al. 2011, 59). In this sense, I understand gathering to involve aesthetic or curatorial sensibilities ("akin to identifying constellations among the stars of the night sky" [Pierce et al., 2011]), drawing *in* or including particular objects or beings for a particular purpose, even at the exclusion of others.

"Gathering," I propose, is a way of understanding how communities are assembled in place by both human and more-than-human actors that acknowledges diverse expressions of agency. Massey (2005)'s understanding of places as a "throwing together" of diverse beings and entities has been useful for understanding how different actors negotiate their roles in relation to place (e.g., Bærenholdt and Granås, 2008; Schmidt, 2017). However, as Pitt (2013) suggests, this agency is not only expressed in *negotiating* the boundaries and relations of already existing places, but in the *creation* of places themselves–that is, "gardens of bringingtogetherness," or places that are "brought rather than thrown together" (197). From this perspective, gathering is not at all haphazard, but instead "guided by skill and feelings as we work to achieve goals and pull towards those we have an affinity with" (Pitt 2013, ii). Human ecovillage residents articulate their "gathering" sensibilities when they narrate "what works well together" in a garden (and what does not), or what species or systems of knowledge are useful (or not), and for what purposes. However, these understandings are also

challenged in place by more-than-human others, which engage in their own gathering practices. Although the underlying motivations or "rationale" of more-than-human gathering practices remain inaccessible to human modes of investigation, traces of more-than-human agency are visible in the ways that they comply, resist, or evade human plans.

For humans, a politics of knowledge is at the center of these "gathering processes"– what kinds of knowledge are valued, and for what purposes, are decisions that are founded on deeper social currents. For example, Holmgren (2002) flattens diverse forms of indigenous knowledge into a similar "kind" as a foil for permaculture, which he frames as drawing on the same kinds of perspectives that "can be seen as common to all indigenous tribal peoples" (1). While Holmgren acknowledges the role of "indigenous and traditional cultures of place" in providing the inspiration for permaculture design, he identifies permaculture as distinct in its "post-modern" approach to combining different systems and traditions "without regard for any fixed aesthetic or tradition" (2002, 22). This "gathering" of different practices or bits of knowledge is not neutral, but rather characterized by a complex knowledge politics that can elide epistemological legacies and ties to particular places, or privilege certain perspectives at the expense of others, according to dominant understandings of sustainability that emerge in each community.

2.4.2 Coherence

The second thread of assemblage formation, what Anderson and McFarlane (2011) call "coherence," describes the state where "gathered" entities might begin to be understood as parts of broader assemblages. "Coherence," (from the Latin verb *cohaerere*) implies closeness nearly to the point of sameness, suggesting both material unity ("to hold together as a mass of parts"[19])–as well as logical consistency. Following Lehrer (1986), I understand

[19] Merriam-Webster, s.v. "cohere," last modified March 30, 2022. https://www.merriam-webster.com/dictionary/cohere

"coherence" as the interpretive work that occurs at the "the intersection between the mind and the world," with the goal of establishing relational harmony both between concepts and other beings or material entities. As a conceptual tool, then, "coherence" provides a language for thinking through both the material and immaterial dimensions of how more-than-human beings might operate as part of broader functional systems, such as agroecosystems. From this perspective, I argue, coherence involves the development of a sensibility of cohesion, wholeness, or complementarity–a process which I call "coherence-making."

I understand coherence not a definitive state of being, but instead one which hinges on an individual's experiences in relation to other beings in place. For humans, coherence is theorized as a process of organizing knowledge into comprehensible and logical patterns, and as such is a central process in the construction and legitimation knowledge (Lehrer 1986, Davidson 2000, Thagard 2007). Such an understanding emphasizes the subjective nature of knowledge construction, where previous experiences and understandings are recalled and applied in context. Li (2007) notes that assemblage hinges on the dual processes of "authorizing knowledge," or the confirmation of existing archetypes and understandings, and "managing failures and contradictions" (265), or the capability of responding and negotiating these understandings in relation to emergent circumstances. As DeLanda (2006) argues, "some process must give these singular impressions and ideas a certain unity...the habitual grouping of ideas through relations of contiguity (in space or time)...[or the] habitual pairing of causes and effects by their perceived constant conjunction, turns a loose collection of ideas into a whole with emergent properties" (48). As disparate entities, beings, practices, and concepts are brought together in the production of sustainable communities, edges are smoothed to allow the pieces to fit together.

Negotiating existing forms of knowledge in relation to new places is a central feature of ecovillage experiments. As discussed above, many ecovillage residents founded or arrived

at communities in places geographically, culturally, and ecologically distinct from where they grew up. Even if these residents are knowledgeable about domains central to ecovillage life, such as animal husbandry or gardening, these previous experiences often must be adapted or reconfigured in relation to the places where the community is located. This is demonstrated, for example, by Despret and Meuret's (2016) discussion of a resurgence of sheepherding in Southern France in the 1990s, which emerged as a resistance to agricultural modernization and intensive pasturing that had begun in the 1960s. As Despret and Meuret (2016) discuss, the "breach in transmission" of knowledge between generations obviated a simple return to traditional practices. Rather, shepherds had to "learn to compose with the world in various ways...invent[ing] ways of inhabiting a world that is being destroyed while resisting, locally and actively, this destruction" (30). This process of "learning to compose with" is at the heart of what I mean by coherence-making, in the sense that knowledge is co-produced with more-than-human others in experiences of place.

Practices of more-than-human care reflect underlying relational values systems, and become sedimented in landscapes over time (Aistara 2018). Through repetition and rhythms of daily farm work, for example, farmers and community residents are drawn deeper into interspecies relationships (Bankovska 2020, Singleton and Law 2013). What, and how, ecovillage residents care for the more-than-human others not only reflects distinctive sustainable visions, but reveals a process of active place-making, in which some more-than-human relationships are cultivated while others are not. Such a relational values perspective understands relationships between humans and more-than-human others have normative value beyond instrumentality (Himes and Muraca 2018) or "labor and productive relations" (Saxena et al. 2018, 56), but rather are "reflective and expressive of care, identity, belonging and responsibility, and congruent with notions of what it means to live a 'good life'" (West et al. 2018, 35). Tracing this "relational ethics of care" Westerlaken (2020) reveals a politics of

prioritization, with the "desires and needs of some subjects [coming] to be favored over those of others" (Lonkila 2021, 482). From this perspective, care might be understood as a "negotiation about the coexistence of different values" (*Ibid*.) or the "continual efforts of *doing* ethics," rather than proceeding from ready-made formulas or rubrics for making decisions about more-than-human lives (Westerlaken 2020).

This is not to suggest that humans are the only actors that engage in coherence-making; more-than-human others have social lives of their own, and might align themselves with human plans or not. Animals, for example, engage with places in the sense that they "engage their senses, thoughts and emotions in the material-semiotic production of the world as a meaningful place" (Cornips and van den Hegel 2021, 186). As Phillips and Robinson (2020) point out, non-native species like bees still make coherence by "making sense" of new environments, which might also be understood as niche creation. While this process is a creative one, Lewontin (1983) argues that it is not wholly unconstrained: "the error is to suppose that because organisms construct their environments, they can construct them arbitrarily in the manner of a science fiction writer constructing an imaginary world" (283). While more-than-human forms of coherence-making remain difficult to explain without resorting to anthropocentric concepts (i.e., "knowledge construction," or "making sense,"), the impacts of more-than-human agencies are rendered.

Because more-than-human others are themselves engaged in networks of ecological and social relationships (Panelli 2010; Taylor and Pacini-Ketchabaw 2015; Greenhough 2016), more-than-human agency constitutes more than what might be understood as individual "will" or "intent" (Giaccardi and Redström, 2020), but instead is produced through relationships that more-than-human others have with their own environment. Following farmers' practices of caring for chickens, Donati (2019) recalls how "practices of self-care" guide the daily rhythms of chickens themselves, describing dust baths and collective naps

that characterize chicken social worlds. Similarly, Despret and Meuret (2016) observed that shepherds not only had to learn "how to lead, how to understand other modes of living, [or] how to form a flock," but the sheep themselves also had to learn to "compose with dogs and humans, to acquire new feeding habits, a new ethos, and more-over, new ways of living in an enlarged world" (81). The complexity of these more-than-human entanglements may only be partially visible or knowable to ecovillage residents and agriculturalists. At the same time, these relationships can produce vital, material consequences for not only particular more-than-human others, but for the "messy world that is the emergent product of all the ways in which its motley inhabitants engage with and attempt to make sense of each other" (Kohn 2013, 68).

This process of coherence-making is regularly challenged in practice. Crops might fail to grow, due to error, miscalculation or misunderstanding, or reasons entirely unknown. Livestock might turn up their nose at the forage crops or kitchen scraps prepared and offered to them, instead choosing crops grown for human consumption in kitchen gardens or new growth from conserved areas of the forest. Expensive equipment and machinery might break down in the process of use or due to the environment (e.g., humidity, heavy rains, heat, etc.); fences fall, walls crumble, and tools break. The ways in which more-than-human others are expected to perform, and the ways in which they sometimes fail to, reveals the latent power of more-than-human actors (or "actants," in the parlance of Actor Network Theory) in the process of assemblage construction. These "failures," in turn, flag a human response: for instance, replanting garden beds with different companion species, using other materials for building homes or barriers, or finding low-tech alternatives. These events indicate the ways that more-than-human assemblages begin to unravel (or, borrowing the language of assemblage theory, are *dispersed*).

2.4.3 Dispersal

To understand more-than-human communities as assemblages, attention must be paid not only to how disparate elements become "open-ended wholes," but also how these assemblages might be unmade (and remade). Scholars writing on assemblage theory have approached this by developing an understanding of "relations of exteriority," or the ways that constituent parts of a social assemblage articulate with still other assemblages. From this perspective, parts of an assemblage are not only defined by their relationships to other elements within an assemblage, but affords them a degree of "relative autonomy," so that they may be "plugged into another [assemblage], entering into new interactions" (DeLanda 2016, 10). In turn, these external relationships continuously act on and transform the constituent elements of assemblages, ultimately changing the terms by which these components were gathered together and made to cohere in the first place. Considering these relations of exteriority call attention to the processual and transformative qualities of assemblages, and the ways that "components are constantly connecting in new ways and taking new forms: they assemble, disassemble, and reassemble" (Lahti and Kolehmainen 2020, 610).

Considering relations of exteriority provides a way to understand more-than-human others beyond the ways that humans might understand or desire them to function as parts of broader socio-ecological systems. The cows, bees, corn, or coffee plants that comprise the localized socio-ecological systems of ecovillage communities each are engaged in relationships both with one another, but also with beings that are not part of the community. For example, in addition to their relationships with other livestock or the grass in the pastures they shared, the sheep of Rancho Bosque were also entangled in relationships with parasitic worms, fleas, viruses, and bacteria. As Bennett (2010) observes, "each member and proto-member of the assemblage has a certain vital force," and as such, "an assemblage is never a

stolid block, but an open-ended collective" (24). Returning to the understanding that organisms change the environment for both themselves and other organisms through practices of niche creation, it follows that organisms might also destroy or make unlivable environments for other beings. In this sense, "conviviality" might be rendered not only as "living together," but also "dying together" (Donati 2019).

As with "gathering" and "coherence-making" processes, patterns of care are also reflected in the ways that more-than-human assemblages are unmade or dispersed. Drawing on Foucault's (2003, 2007) understanding of biopolitics as the politicization of control of human life, post-humanist scholars have translated and drawn inspiration from biopolitical discourse in understanding more-than-human subjects.[20] Knowledge about how to "manage" more-than-human communities might be seen as a kind of a relational biopolitics, reflected in practices of culling, killing, and harvesting but also inhibiting, weeding, or otherwise working against particular species. Considering "care" from this perspective reveals a different shade of biopolitics; one which suggests "an element of control…and boundary–by which different forms of life are separated," and reflects that "for certain life to prevail, other forms of life must be discarded (Wrigley 2018). As discussed above, this is also in itself a process of gathering, restarting the loop of gathering, coherence, and dispersion; in other words, bringing about death is also a practice that opens some avenues and forecloses others.

2.5 Conclusion

The goal of this chapter has been to introduce the key theoretical strands that inform the analytical structure of the dissertation. Drawing on multispecies approaches, I first explain how ecovillage communities might be understood as "more-than-human" assemblages. Ecovillage communities are sites where knowledge and place are deeply

[20] For more on the distinctions between the different "versions" of biopolitics that have emerged, see Asdal et al.'s (2016) introductory chapter in "Humans, Animals, and Biopolitics: The More-Than-Human Condition."

entangled, informed by divergent narratives of sustainability particular to each community; in order to trace these entanglements, I propose following patterns and practices of more-than-human care as a way of tracing how knowledge settles in and transforms places (which in turn, necessitate new ways of knowing). Taking the "assemblage" metaphor further, I then expand on three strands of assemblage theory–gathering, coherence, and dispersal (Anderson and McFarlane 2011) in order to trace how care, inflected by relational values–might be understood at each assemblage "stage."

In the analytic chapters that follow, I follow the flows of "gathering, coherence, and dispersal" as a sort of guide, exploring how particular species, knowledge systems, practices, and ideas come together in particular spaces, are made to (or make themselves) into associations with one another, and ultimately disperse or transform. Such a structure maps well onto familiar narrative patterns of birth, life, and death, which is particularly useful for talking about interactions between biotic life forms (although not exclusively–ideas, and even ecovillage projects themselves, can "die," and in some senses, be reborn). I see such an approach as complementary to Kohn's (2007) project of pursuing a so-called "anthropology of life," with the goal of "situating all-too-human worlds within a larger series of processes and relationships that exceed the human" (6).

Chapter 3. Methodology

This chapter describes the methodological approaches that orient the research project, and documents the strategies employed for data collection and data analysis. I begin by explaining the relevance of qualitative ethnographic methods for addressing the core research inquiry: how sustainability narratives are conceptualized, performed, and transformed by both human and more-than-human others in ecovillages. Drawing on descriptions of each research site visited, I highlight salient aspects of each community's approach to sustainable design. I then describe details of how this ethnographic work was carried out, with particular attention to practices of multispecies ethnography, as well as considerations for research design and site selection given the research context. Finally, I describe the processes of data analysis, as well as considerations and limitations to the results of this work.

3.1 Methodological Orientation: Navigating Sustainabilit(ies)

This dissertation employs an interpretive, qualitative methodological approach, particularly drawing on methods germane to the field of environmental anthropology, in order. Denzin and Lincoln (2008) provide an overarching definition of qualitative research as "a situated activity that locates the observer in the world, [which] consists of a set of interpretive material practices that make the world visible" (4). As Denzin and Lincoln (2008) explain, qualitative research involves drawing on a "wide range of interconnected and interpretive practices," and acting as a sort of *bricoleur*: assembling "different tools, methods, and techniques of representation to the puzzle" (4-5) in ways that are "pragmatic, strategic, and self-reflexive" (Nelson 1992, in Denzin and Lincoln 2008). This approach is premised on the understanding that knowledge is situated and partial (Haraway 1988), and that interrogating these diverse partialities is possible through a triangulation of multiple strategies for qualitative analysis.

Within this broader ontological approach, ethnographic methods are particularly useful for interrogating sustainability as it is conceptualized and practiced in ecovillage settings. As a form of qualitative research, ethnography is particularly useful for understanding cultural differences through immersion (participant observation) and reflexive inquiry (Brewer 2000; LeCompte and Schensul 2010; Schensul and LeCompte 2012). Ethnography as "not one particular method of data collection, but a style of research that is distinguished by its objectives" (Brewer 2000, 11), drawing on in-depth interviewing, participant observation, and/or discourse analysis strategies to understand the "sociocultural dynamics animating a particular human population" (Adams 2012, 339). Murphy and McDonough (2016) argue that "since sustainability discourses exist across a range of varied spaces, they are forged with different kinds of emphases, wherein we find differing ethics and politics at play," and as such, "ethnography is a useful methodological being to shift between these layers" (xix).

In recent years, there has been growing attention to the possibility (and generative potentialities) of considering more-than-human actors as ethnographic subjects in their own right (Kirksey and Helmreich 2010, Ogden et al. 2013, van Dooren et al. 2016, Locke and Keil 2015; Locke and Münster 2018). Informed by theorizations of more-than-human others as social actors with agency (discussed in chapter 2), multispecies ethnography studies "the host of organisms whose lives and deaths are linked to human social worlds…[and] centers on how a multitude of organisms' livelihoods shape and are shaped by political, economic, and cultural forces" (Kirksey and Helmreich 2010). Broadly, more-than-human ethnographic approaches are those that "de-center" the human in research, and which focus on "cultivating attentiveness" (van Dooren et al. 2016) or "attunement" (Ogden et al. 2013) to more-than-human subjects as co-creative forces of human biocultural realities. If more-than-human actors are understood to have agency, then what might we gain, as Phillips and Robertson

(2020) ask, from thinking "beyond the human register to appreciate chickens, bees, and other non-humans as place-makers, as inhabitants caught in and formulating the negotiations and trajectories" of places?

Disentangling concepts of human and more-than-human agency is tricky business, as the former has often been theorized in relation to the latter. For example, while Sayes (2014) describes nonhumans as "necessary for the existence of society, as active mediators, and as components of our moral and political associations," he is careful to extend an expansive definition of agency on the grounds that "nonhumans do not have agency by themselves, if only because they are *never* by themselves" (144). Similarly, Bauer and Bhan (2018) write that it is humans, "how they differentially assemble nonhumans and negotiate their meanings…that largely condition the contexts for nonhumans to affect human lives," arguing that "nonhumans become particular kinds of actors in particular contexts, the production of which is often predominantly human" (26-27). Such arguments rest on a narrow construction of agency characterized by intentionality, creativity, or consciousness (Nash 2005, Knappet and Malafouris 2008), with the results that nonhumans–now recognized as "actors," in the sense that they indeed influence or constrain human action (e.g., Bauer and Bhan 2018), are relegated once again to a background or supporting role.

For the purposes of this research in particular, I am chiefly concerned with developing an understanding of more-than-human agency that is methodologically accessible, and for this reason gravitate towards conceptions of human and more-than-human agency as distinct yet interrelated, rather than as unequal or incomparable. As Pearson (2015) notes, nonhumans can also display agency when they "influence, enable and sustain human intentions and activities" (713) or any number of other actions; following Latour, agents exert agency in that they "authorize, allow, afford, encourage, permit, suggest, influence, block, render possible, forbid..." (Latour 2005, 72, quoted in Pearson 2015). More-than-

human beings have social lives of their own, engaging with others in ways that are both expected and unexpected, seen and unseen, by their human interlocutors (Pearson 2015). In the analytic chapters that follow, for example, I am particularly drawn to instances where nonhumans emerged as challengers to human plans for them as a result of their relationships with other nonhuman beings–actions which ultimately unmade, altered, or transformed human plans for "sustainable" socio-ecological systems.

One of the key goals of multispecies ethnography has been to understand other beings on their own terms, rather than through a lens of human exceptionalism. However, this task is much more easily said than done. As Moore and Kosut (2014) write of their ethnographic work with beekeepers, for instance, "intra-species mindfulness works to track the frictions rather than pin down the object"–that is to say, the act interpreting more-than-human worlds will always be limited by the fact that these interpretations will be "diluted by humanness" (525). Although ethnography is well-suited for exploring for the "multiplicity, hybridity, and indeed uncertainty of sustainability discourses and forms" (Murphy and McDonagh 2016, xxi), the task of "document[ing] and analyz[ing] such assemblages in the course of their emergence" (Rabinow et al. 2008, 58) challenges remain in translating these theoretical perspectives into methodological praxis (Ghoddousi and Page 2020). For example, Krzywoszynska (2019) problematizes the operationalization of "attentiveness" in multispecies approaches, drawing on Pitt (2018)'s critique of the "pre-existing ontological commitments" that are at work in cultivating this attention (664). Similarly, Locke and Keil (2015) outline the methodological challenges for ethnographers in documenting more-than-human lives in their work on human-elephant relations, noting that "tools of investigation and modes of analysis from biology and ecology would have helped produce a richer account of interspecies encounter by facilitating improved understanding of local elephant lives" (Locke and Keil 2015). While these methodological concerns have been met with broader

calls for cross-disciplinary collaboration (Ogden et al. 2013, Locke and Keil 2015, Pitt 2015), effectively engaging with these diverse disciplinary perspectives remains difficult; as Hartigan (2021) observes, "such methods are straining and insufficient to the challenges posed as multispecies researchers endeavor to incorporate a broader range of animals as ethnographic subjects" (884).

To refine the scope of a more-than-human ethnographic practice in relation to the research at hand while accounting for methodological challenges, the methods for data collection detailed below are aligned by two principles: 1) to seek out diverse forms of knowing about more-than-human others from a range of practitioners and experts, without privileging or evaluating particular perspectives and 2) to be oriented to practices of care. In doing so, I orient myself to Ogden et al. (2013)'s call for a "productive engagement with ontological relativism" that multispecies ethnographies reveal, in part by examining the overlaps, inconsistencies, and gaps between each community. Second, an orientation towards practices of care builds on Krzywoszynska's (2019) understanding of "care networks," or "the webs of interrelations, connections, and dependencies that affect the life and well-being of the primary object/subject of care" (664). Practices of care are inherently connected with a sense of attentiveness to other beings (Krzywoszynska 2019), and tracing these can illuminate the latent interdependencies and multispecies relationalities that underpin communities like ecovillages.

Below, I summarize and briefly compare the communities selected as research sites for the project.

3.2 Site Selection

Three primary research sites were initially chosen for this project: EcoMonte in Jalisco, Aldea Ceiba in Yucatán, and Rancho Bosque in Veracruz; later, a fourth site, Tierra

Madre, was added.[21] Each of these communities offered me a space in the community in exchange for a contribution of labor, a small donation, or a combination of both. These sites were selected by searching for postings on sites like Workaway and WWOOF (Worldwide Opportunities on Organic Farms), online networks that are popular among backpackers and volunteers searching for work-exchange arrangements. I also reached out to ecovillages that had some form of online presence and contacting members through email or Facebook messages. In some circumstances, ecovillages declined my proposed research stay because they were a private community or closed to outside visitors; in other cases, my attempts to contact residents were unsuccessful, as their online presence was a ghostly remainder of an ecovillage which had already ceased to exist.

Cognizant of the fact that there must certainly be ecovillages that are undocumented or without a consistent online presence, I solicited recommendations from ecovillage residents I consulted in the preliminary stages of my research, and maintained an active search for ecovillage sites that were not initially on my radar by following Facebook groups and online forums dedicated to permaculture or ecovillages in Mexico. This approach led me to an additional research site–Tierra Madre, in Morelos–during which I conducted additional participant observation and several interviews. In other cases, I was able to make day visits to particular ecovillage communities that were not open to long term stays from non-members–for example, day-long festival events or in guided tours. In some of those instances, I was able to speak with ecovillage residents who lived in these kinds of communities.

3.3 Research Sites

In the earliest iterations of this project, I had initially intended to focus on three ecovillage communities as primary research sites, supplementing these periods with shorter

[21] Tierra Madre effectively became a replacement for EcoMonte as a key research site, although approximately 3 weeks were spent in EcoMonte.

visits to additional sites. After visiting a number of communities encountered along the way, this “third site” was gradually amended to encompass experiences across two communities (four key research sites in total). These adjustments to the research plan were a necessary response to the diversity of community structures I encountered during my field research. EcoMonte, a community in Jalisco that I had initially planned to spend several months in, had become nearly empty of permanent residents since my initial visit; more and more residents treated their residences on the land there as weekend getaways, or places to rent out to visitors as eco-touristic bungalows. Other communities like Tierra Madre, Mexico's first “feminist ecovillage,” were still in the founding stages; while some buildings and basic infrastructure had already been established, residents were still putting systems into place, figuring out how their community would operate, and thinking about what it might become. “Eco-communities” in formation are also becoming more visible in areas popular with foreign expatriates, for whom sustainability has become an important dimension of their vision of a future lifestyle. In addition to three primary sites where I conducted research for several months apiece, this dissertation is also deeply informed by visits to a range of other ecovillage and communitarian projects throughout Mexico, and informal conversations with visitors and residents. The research sites are labeled below in Figure 1.

Figure 1. Map of Mexico labeled with approximate locations of research sites. The black points represent primary research sites, while the purple dots represent supplementary research sites (difference in color shading for contrast only).

3.3.1 Site 1. Aldea Ceiba, Yucatán, Mexico

The community of Aldea Ceiba was originally founded in 2016 in a small town in central Yucatán, in between the two cities of Mérida and Valladolid. Many of the core group of residents were part of a group known as the "*Colibri Colectivo*,"[22] which had hosted an annual festival focused on alternative music and ecological living in the outskirts of Mexico City every year. When a friend was given access to a parcel owned by their family in rural Yucatán, the idea of founding a more permanent ecological community on a particular site began to take hold. Though many friends and collaborators were involved in the early days, this has now condensed to approximately 8 or 9 permanent residents at a time; this core group of members is known as the *las semillas* (literally, "the seeds").

One of the key goals of Aldea Ceiba was fostering environmental education

[22] "Hummingbird Collective," pseudonym.

initiatives. The first three points of their community manifesto declare that "the earth is alive, that all beings have the natural and inherent right to sustenance," and that "life, and the elements that support it, are not a business–nobody is the owner of life, nor has the right to exploit it in order to satisfy their ego."[23] To this end, Aldea Ceiba envisions itself primarily as a center for the interchange of knowledge (*intercambio de saberes*), particularly with regard to the ways in which humans relate themselves with other species.

Aldea Ceiba residents expressed a collective sense of gratitude towards and respect for their Maya neighbors, with whom they had consulted and worked alongside in developing their community into a livable space. Gloria, one of the founding members, had developed a series of cultural programs for the youth in the community–including hosting a mathematics competition, environmental education and conservation programs, dance, art, and a workshop in documentary filmmaking. These workshops, largely held after school in the local community center, culminated in a month-long festival each spring. Other residents organized regular events for community members, including initiating a sewing cooperative with local women and birdwatching meet ups with school children.

The environment of the central Yucatán peninsula is quite different from Mexico City. The climate is hot and dry much of the year, with temperatures ranging between 24-29ºC,[24] and is classified as a tropical savannah.[25] The rainy season lasts from May or June through October, followed by a prolonged dry season.[26] Despite the lack of precipitation and inland rivers, subterranean rivers running below the peninsula's karstic limestone bedrock provide a year-round source of freshwater, accessible through pools in caverns and caves known as *cenotes*. Thin layers of soil–often high in iron and low organic matter–blanket the bedrock below, interspersed by outcroppings of limestone boulders. Traditional Maya

[23] Community website, Accessed December 2019.
[24] Average daily mean temperature (https://en.climate-data.org/north-america/mexico/yucatan-37/).
[25] *Aw* or *As* on the Köppen-Geiger climate classification system. (*Ibid.*)
[26] Monthly average rainfall November-April is <40mm. (*Ibid.*)

swidden agricultural practices have long shaped the tropical forests of the Yucatán (Ford and Nigh 2015),[27] but the effects of widespread deforestation in the early 20th century as a result of plantation agriculture are still visible in the patches of forest landscape (Turner et al., 2001). Much of Aldea Ceiba is surrounded by scrubland and low forests, or traditional *milpa* polyculture plots (either actively cultivated by nearby communities, or in various stages of recovery). The community's land is somewhat accessible by an unpaved road, and is largely forested; there is also access to a large cleared *milpa* at the edge of their parcel; they also have three large cenotes nearby, two of which are accessible for swimming, collecting fresh water, and fishing.

The number of residents at Aldea Ceiba fluctuated greatly throughout my visits to the community. Approximately 8 permanent members lived in the community, and this is supplemented by other close friends, both from Mexico City and abroad, who live in the community for long periods at a time, but are not necessarily considered *semillas*. Aldea Ceiba regularly hosts workshops for children in the local town of Aldea Ceiba in a regular rotation, during which time workshop instructors, artists, and dancers take up residence in the community. At any given time, there are several non-*semillas* who take on various administrative roles known as *estancias colaborativas* (collaborative stays), including handling transportation of visitors, preparing and managing meals for the community, and a "host," in charge of providing tours and orientation to new guests. Finally, the community regularly hosts a rotating group of "apprentices," who pay a small amount for food, lodging, and participation in two-week educational series on various topics related to regenerative agriculture, conservation, and beekeeping. Depending on the season and the nature of ongoing activities, between 10 and 35 (or more) people are in residence at any given time.

[27] Turner et al. (2001) note that forests had a relatively short recovery of 20-30 years, owing in part to the selection of particular tree species characteristic of traditional forest management practices.

Over the course of three years of having access to the land, Aldea Ceiba has developed rapidly. By the third after their founding, Aldea Ceiba had accepted over 100 visitors from countries all over the world, and had established communal buildings, a solar energy tower, and spaces for an apiary and for the care of poultry birds. As the project was being built up, the community maintained a residence in a rural town in central Yucatán, through which the forested site could be accessed by a small road and food supplies and other goods could be purchased. While the community is now largely focused on living in the forested site (often referred to simply as *el terreno*, ("the land"), they still maintain the residence in town as an office space and extra accommodation for visiting guests and workshop participants. Coordinating communication between these sites–as well as the flow of people and volunteers, who travel often to town to use the internet, purchase additional food, or arrange transportation to nearby cities.

Aldea Ceiba residents drew from a bouquet of regenerative agriculture strategies, drawing particular inspiration from the principles of permaculture and agroecology. Permaculture is structured around three key ethical tenets: "earth care," "people care," and "fair share" (or "set[ting] limits to consumption and reproduction, and redistribute surplus" [Holmgren 2002]). These aims are accompanied by twelve principles of permaculture design–among them, for example, "produce no waste," "use and value diversity," and "use small and slow solutions" (Mollison and Holmgren 1978, Holmgren 2002). This was reflected, for example, in planting diverse polycultures of perennial crops with the goal of developing self-supporting communities of plants.

Over the course of my fieldwork, Aldea Ceiba also began experimenting with syntropic agriculture. Syntropic agriculture refers to a technique articulated by Ernst Götsch, a Swiss researcher and farmer that migrated to Brazil in the early 1980s (Andrade et al. 2020). Syntropic agriculture bears a resemblance to other techniques germane to

agroecology, including “no use of chemicals, no-impact or low-impact technologies, and a design strongly based on ecological succession” (Andrade et al. 2020, 21). A distinguishing element is the concept of “syntropy” (or “negative entropy”) as an organizing force of biological life. While entropy “has brought the understanding that all concentrated energy in the universe tends to dissipate, simplify, and dissociate,” syntropy rather reflects “forming structures, increasing differentiation and concentration, as with life” (Andrade 2019). Syntropic agriculture is understood by its proponents fundamentally as a syncing of agriculture with regeneration, seeking to transform the way farmers interact and understand nature: “in Syntropic Farming, holes are nests, seeds become genes, weeding becomes harvesting, [and] pests and diseases are seen as the ‘agents from the department of optimization of life processes’” (*Ibid.*). Aldea Ceiba in particular focused on experimenting with two strategies central to the syntropic method: stratification (creating multi-layered, mutualistic plant communities that mimic forest succession) and rebuilding degraded soils through agriculture.

3.3.2 Site 2. Rancho Bosque, Veracruz

Though the land now known as Rancho Bosque has gone through several iterations, the focus on education of younger generations has always been a consistent thread in the community's development. Community life in Rancho Bosque is formulated in such a way that farm work is divided amongst young apprentices who live in residence with permanent residents, comprising an *ecoaldea* (ecovillage) and learning community in one. Jens, one of the founders of Rancho Bosque, had come from a background in international development and had authored guidelines for Mexican farmers to increase pasture productivity through the use of electric fences. The idea behind Rancho Bosque arose from Jens' involvement with a government-sponsored program to develop informal training centers for young people from

local cities who had grown up without access to land or experience with *agropecuario* (agricultural) systems:

> We thought a lot about those young people who came from the city environment...they don't know much [about agriculture], nor can they distinguish an ox from a cow, and it made the *campesinos* (farmers) laugh…they were not going to take them seriously. so, we wanted them to learn something about agriculture and *ganaderia* (livestock farming) in those *ejidos*.[28]

The goal of Rancho Bosque, then, was to capacitate local young people while also developing a community of biodynamic/ecological farming across the region. Similarly, Jens' experience in development programs contributed directly to the community's structure as a kind of agricultural school; in Jens' view, Rancho Bosque presented a way to disseminate knowledge to an assembled cast of young people from the region, with the understanding that these apprentices would begin their own programs upon their return to their families and hometowns.

The community of Rancho Bosque comprises between six to fifteen individuals (and at times, perhaps even more), of which most are long-term residents. Apprentices are usually supported by a mix of stipends and grants, either directly from the community of Rancho Bosque itself (supported in turn by international nonprofit organizations) or through government programs targeted towards professionalizing rural youth. At any given time, there are also between one and three volunteers from foreign countries; recent and current volunteers during my fieldwork were from Germany, Japan, France, Spain, and the United States. Other central figures in community life include local farmers and workers from nearby communities were also consulted and employed on a long-term basis. Finally, long-term residents also included teachers of various subjects (usually adjacent to agriculture) who split their time between working in the fields or pastures and doing administrative and teaching work. Rancho Bosque was decidedly hierarchical in its

[28]Interview with Jens, February 11, 2019.

social structure, with the decisions of the two landowners often taking precedence over other apprentices or temporary residents.

Rancho Bosque is located outside of Xalapa, the state capital of Veracruz. The area around Xalapa is classified as humid, subtropical highlands,[29] and is known for its distinctive cloud forest environment (*bosque de niebla* or *bosque mesófilo de montaña*), one of the most biodiverse ecosystems in Mexico.[30] Early morning mists and rain are common, with the greatest rainfall between the months of June to September.[31] The transformation of the cloud forest for human use (growing coffee, sugarcane, grazing for livestock, or urbanization) has led to a significant fragmentation of forest cover, although some protected areas such as the *Santuario Bosque de Niebla* (Cloud Forest Sanctuary) project at the Institute of Ecology (INECOL) remain. Deep soil deposits in the region are formed by volcanic ash and largely acidic; however, upper soil horizons are rich in humus and organic matter, making them suitable for agriculture (Samain and Castillo-Campos 2020). The region is well-known for producing coffee, and many farmers in the outskirts of Xalapa (including at Rancho Bosque) cultivate shade-grown coffee under the canopy of older growth forests.

While Rancho Bosque began as a conventional farm with a particular focus on livestock and rotational grazing, the overall strategy of the farm had shifted in recent years to adopt biodynamic agriculture more explicitly. Biodynamic agriculture, an offshoot of a broader humanist philosophical approach known as "anthroposophy," frames agricultural practice fundamentally as an exchange of energetic flows, viewing the farm as a "whole organism" composed of different constituent elements. Rancho Bosque did not practice biodynamics from the outset of the project–instead, Jens encountered anthroposophy, and

[29] *Cfb* (bordering on *Cfa*) in the Köppen-Geiger climate classification system.
[30] Cloud Forest Sanctuary (*Proyecto Santuario Bosque de Niebla*), Institute of Ecology INECOL). https://www.inecol.mx/inecol/index.php/es/ct-menu-item-25/ct-menu-item-29/15-proyectos/153-proyecto-santuario-bosque-de-niebla
[31] Xalapa Climate Data, https://en.climate-data.org/north-america/mexico/veracruz/xalapa-5707/. Accessed June 15, 2020.

later biodynamics, through a relative that had attended a Waldorf school (an educational style also developed by Steiner on anthroposophical principles). These two experiences had a strong influence on the way that Rancho Bosque practiced agriculture–namely, through a focus on cultivating livestock animals over any other farm area. Some ecovillagers related the perception that different forms of agricultural practice were perceived to "fit better" with particular species: that "permaculture was more about plants–biodynamic agriculture is better for systems with lots of animals."[32] Biodynamic agriculture and rotational grazing are discussed in greater depth in chapter 4 (in particular, the section "Gathering Knowledge") and chapter 9.

During the time I spent in this community, their attention turned more and more actively towards ramping up production of coffee, in hopes of securing wider profit margins by offering a product that was not only suited to local climatic conditions, but seen as something of a regional specialty. Growing coffee is not without its challenges–one of the residents whose chief role was planning the use of land had had experience with growing coffee in his native country of Guatemala, and reflected how growing coffee for a profit involved much more than "simply" growing and harvesting the fruit of the coffee plant.[33] To begin with, coffee also needed to be washed, fermented, dried, roasted, and ground–processes that involved enormously expensive equipment, especially for small operations hoping to make a go of it without the help of a cooperative. However, the promise that shade-grown, biodynamic coffee could fetch a higher price, especially among wealthy, health-conscious neighbors that lived in the verdant cloud forests surrounding the city of Xalapa, was attractive to residents. This move was further encouraged by the success of former partners–a group of coffee producers surrounding the nearby town of Coatepec–who had

[32] Field Notes, First Community Walkthrough, July 2018
[33] Field Notes, February 6, 2019.

found similar success after receiving a certification from the international biodynamic association Demeter and beginning to export their coffee to countries like Germany. For these reasons, when I arrived to begin my fieldwork, much attention was paid towards preparing for more intensive production: terraced hillsides on the property, which had previously grown fallow in disuse, were cleared again for planting coffee plants, and much effort was spent tending to plants, collecting, and fermenting coffee fruits, drying the coffee beans batch by batch.

3.3.3 Site 3. Tierra Madre, Morelos

Tierra Madre was established by two partners in 2018, and was still in the process of formation during my visits there. The community consisted of five permanent and financially vested residents, and had recently begun accepting volunteers and temporary residents on a rotating basis. In addition, hired laborers from the town nearby are significant participants in daily community life–in addition to constructing houses or other buildings, they also helped to construct raised beds, irrigation systems, and other infrastructure in the garden.

Tierra Madre is located on the periphery of a small town in Morelos, several hours by bus from Mexico City. The region is classified as subtropical highland[34] and generally warm and temperate, with average temperatures between 16-21.5º C and a distinctive rainy season from May to September.[35] The state of Morelos has large urban populations in nearby cities like Cuautla, with farming communities interspersed between rolling foothills of Popocatépetl, one of Mexico's tallest peaks and most active volcanoes. In 2017, a 7.1 magnitude earthquake struck nearby Puebla, toppling buildings and significantly damaging infrastructure in the surrounding area; this event continues to affect regional development

[34] *Cwb* in the Köppen-Geiger climate classification system.
[35] Anecdotal accounts suggest that the rainy season is beginning and ending progressively later in recent years, suggesting seasonal changes due to climate change.

today (OECD 2018). Although agriculture (particularly sugar cane and rice) has historically been central to the economy of Morelos, this has shifted to industrial and service-based industries in recent decades, owing to the decentralization of industrial production in Mexico City (Stringer 1972, Lomnitz-Adler 1992).

Tierra Madre was designed as a community exclusively for women, and predominantly lesbian women. In describing their community's aims, Tierra Madre residents affirm that "women deserve a better life in communities of women, with the world, and mother earth,"[36] prioritizing autonomy and self-sufficiency alongside their relationships with the environment. While individually each resident had skills that were pertinent to the development of the community– gardening, architecture, or communication and public outreach, for instance–integrating these skills into cohesive community systems was a frequent challenge. This struggle to reconcile competing strategies or understandings was evidenced by their experimental approach to agriculture; rather than drawing on strategies from a particular approach, different practices and species were gathered in an effort to figure out "what works best." The ways that residents navigate this assemblage process is discussed further in chapter 5 ("Gathering Through Exclusion").

3.3.4 Additional Research Sites

In addition to the primary research sites, I also conducted research in several other locations which were identified as relevant connections between the ecovillage communities and other sites became apparent. One of these was a community I call Eco Monte, and was initially identified as a key research site (see chapter 3 for further discussion). EcoMonte was constructed in 2012, with the aim of "living in a self-sustainable manner and in harmony with nature."[37] The land of EcoMonte (approximately 14 hectares) was purchased in portions from

[36] Social media channel descriptions archived in digital research notes, accessed June 2019.
[37] EcoMonte WWOOF page, archived in digital research notes, accessed May 2019.

the original landowner by a family interested in developing a homestead on the secluded hillside; later, 20 parcels of the land were sectioned off and sold to private individuals. The community continued to grow until 2015, after which some of the residents relocated to nearby towns or cities for work and family obligations. While EcoMonte received several foreign volunteers through publishing volunteer opportunities on websites such as WWOOF, the frequency of visitors has also declined as residents have spent more time outside of the community in recent years. Houses and treehouses (*nidos*, or nests) made from natural materials (*adobe*, wood, compressed earth) have instead been reformatted as tourist spaces, which are often rented on the weekends to tourists through services like Airbnb. Experiences in this community during a scoping research trip in 2014 directly informed the design of this research project, and feature at the beginning of chapter 8.

Research visits were also carried out at nearby farms or other ecovillages within the region, which often had associations or were in communication with the communities in which I carried out longer term fieldwork. These site visits consisted of private tours and interviews with community residents, farm workers, or project founders (depending on the context), or involved participation in events open to the public. For example, I was able to visit one ecovillage community that was normally closed to outside visitors or volunteers during an "open doors event," consisting of lectures, guided tours and nature walks, and public performances. Additionally, I visited two national conferences for alternative agriculture: the First Mexican Congress on Agroecology in Chiapas in May 2019, and the Biodynamic Agriculture Festival of the Americas in Guanajuato in September 2019.[38] These experiences helped to triangulate findings from the communities where I resided, and to develop a sense of the localized and networked connections between ecovillage communities and similarly oriented projects or actors.

[38] In both cases, these events were attended by residents of primary research sites or other ecovillage projects.

3.3.5 Points of Comparison and Conflict

While each community shared ostensible similarities in their search to develop sustainable, self-supporting (*autosustentable*) communities, there were also substantial differences between communities including distinct forms of social organization and internal expectations for their residents. One clear example was the ways in which two key communities tended to organize their days, as illustrated in Figure 3. While Rancho Bosque adopted a strict schedule and set times for working, eating, attending lectures and group discussions, and social time, days at Aldea Ceiba were highly adaptive to the needs of the current residents and the projects underway. While all residents had distinct roles and responsibilities within their respective communities–which often constellated around caring for particular areas or species–mobility between these positions was more fluid in Aldea Ceiba, where residents often took turns in various roles, such as managing the kitchen, hosting visitors, or operating the community vehicles. In contrast, residents of Rancho Bosque were stationed in more static roles for longer periods of time. The difference in these collective perspectives informed how residents understood their respective communities as functional socioecological systems, and moreover, how they managed conflicts or issues that arose during the course of each community's development. Figures 2 and 3 below highlight key differences and characteristics of the communities of Rancho Bosque and Aldea Ceiba.

Characteristic	**Aldea Ceiba**	**Rancho Bosque**
Date Founded	2016	late 1980s
Agricultural Strategy	agroecology, syntropic agriculture, permaculture	biodynamic agriculture
Selected Cultivated Species [See Appendix F]	Bees (multiple species), chickens, turkey, ducks, pineapples, papayas, chaya, ramón, pixoy, ceiba, coconuts	livestock (pigs, boar, cows, sheep, goats, rabbits, chickens); *pasto estrella* (star grass), yucca
Size (number of people)	8-9	11-15
Age Range	20s-30s	teens-70s
Volunteers	regularly (~5-12 at a time), no minimum stay	occasionally (2-4); minimum 1 month
Location	Yucatán (rural)	Veracruz (periurban)
Environment (Key Features)	Karst landscape (*cenotes*, caves and sink holes), tropical dry broadleaf forests, pronounced dry/rainy season	Tropical montane cloud forests (TMCF), often cloudy or misty
Community Structure	communal activities in morning and evening, highly adaptable work schedule. Core group of founders and permanent residents (*semillas*) with high overturn of volunteers and visitors	highly structured daily schedule; tasks were assigned by central figures on a rotative basis.

Figure 2. Salient points of distinction between Aldea Ceiba and Rancho Bosque.

Typical Schedule	Aldea Ceiba	Rancho Bosque
06:30-07:00	Personal Time, Yoga Class	Communal Breakfast
07:00-10:00	Personal Time, Communal Breakfast, Morning Circle	Working Period
10:00-13:00	Working Period	Working Period
13:00-14:00	Working Period	Communal Lunch
14:00-17:00	Communal Lunch, Workshops/Programs in town, Special projects, watering assigned areas	Afternoon Tasks (cut fresh grass for animals, clean stables, move manure to compost piles, move animals back to stables)
18:00-21:00	Communal Dinner, Leisure Time (e.g., Visit to Cenote, Reading)	Personal Time (showers, laundry, etc.) Communal Dinner Evening Lecture (math for agriculturalists, anthroposophy, coffee cultivation). Record Daily Notes
22:00	Leisure Time	Lights Out

Figure 3. Typical Schedule at Aldea Ceiba and Rancho Bosque.

3.4 Data Collection

In June and July of 2018, I visited two of the three proposed research sites to probe the suitability of my research questions, conduct preliminary interviews, and establish contacts with ecovillage residents and visitors within Mexico. I returned to conduct more extensive field research from December 2018 to November 2019, during which time I resided and worked in 4 ecovillages in Veracruz, Morelos, Jalisco, and Yucatan.

This study was conceived as a multi-sited ethnographic study for several important reasons. First, relative to my research questions, I was curious about how different strategies for developing "sustainable livelihoods" were formulated and enacted. The ecovillage

communities visited for this project were grounded in diverse sets of approaches towards developing cohesive social structures, gaining an income, and working with particular approaches and strategies in topics such as constructing buildings, planning and maintaining agricultural systems, and incorporating technologies. Mexico is extremely diverse, both from an ecological and cultural standpoint: for this reason, ecovillages based in different regions necessarily exhibit differences in terms of the adaptations to the local landscape, climate, and endemic flora and fauna.

In the context of this research, ethnographic work with human subjects consisted largely of documenting experiences of ecovillage residents (including self-reflexive accounts produced in carrying out fieldwork) as well as the ways that they narrate these experiences and relating them back to broader understandings of sustainability and sustainable livelihoods. As Castrejón Cardenas (2007) observed during their fieldwork at one ecological community in Veracruz, these practices of coherence-making were evidenced by the difficulty of eliciting candid reactions during participant observation periods. As Castrejón Cardenas (2007) writes:

> As I lived there I noticed that [the residents] were very good at describing what they wanted, what they were doing, why they were there. They will tell me for example, "we are a community trying to live a more simple life"... [or] "we are redesigning our culture in order to be more in balance with nature." With time, I felt very much that it was a kind of script. It was something they had learned and they had repeated the message over and over again" (15).

This observation matches with my own experiences interviewing founders and other long term ecovillage residents, who are often accustomed to narrating the purpose of their community to the outside world either in the form of tours, academic presentations, or even funding applications. At Aldea Ceiba, residents offered tours of their community to visitors, pausing at particular places that conjured up a salient point: the edge of the forest, where the layers of the canopy illustrated their eventual goal of developing a multi-layered agroforestry system, or *la mina*, a small pit of limestone from which community members constructed

buildings from “locally sourced” materials. Community residents become adept not only at locating their community in terms of how it differs from “mainstream society,” but also how their community differs from *other* intentional or ecological communities.

To unravel concretized narratives of sustainable community expressed by ecovillage residents, I draw on a range of qualitative strategies (observations, personal communications, interviews, and group workshops) to understand the sociocultural dynamics at play in shaping these narratives. Throughout the course of this project, I relied on four interconnected methodological strategies in order to ensure a richness of data: participant observation, semi-structured interviewing, two “mapping” focus group sessions, and unstructured periods of reflective writing. In the sections that follow, I detail what each approach entailed and how it relates back to the broader methodological strategy, as well as the limitations posed by each.

3.4.1 Participant Observation

Although all ecovillage residents with whom I worked were aware that I was working on a doctoral thesis, most of my research participants and fellow ecovillage residents knew me simply as a “volunteer”. Many ecovillages–in Mexico and beyond–are able to maintain themselves by relying on the presence of volunteers, either by developing their own internal rules for accounting for visitors, or otherwise using online platforms such as Workaway or WWOOF. According to Workaway guidelines, volunteers should be expected to work approximately 5-6 hours a day in a variety of tasks in exchange for accommodation and meals. In some cases, hosts ask for a small monetary contribution in order to cover the added costs of food and basic services which are needed to sustain them. It is not uncommon, for example, for a volunteer to work 5 hours per day while also paying $5-8 USD for the privilege of staying in an ecovillage.

While working with livestock, I cleaned and repaired stables and coops, chopped

grass and prepared animal feed, moved electrical fencing and monitored livestock grazing rotation, helped administer medical treatments and checkups, and on more than one occasion, helped to dispose of corpses. In the garden, I turned compost piles, transplanted seedlings, weeded garden beds, watered plants, and at one ecovillage, was recruited to help plan their crop rotation.

I attended lectures, classes, and longer multi-day workshops held by ecovillages on various topics, from the basics of biodynamic agriculture to a multi-day practicum working with native Yucatec bees. The structure of these meetings varied depending on the setup of each ecovillage. Rancho Bosque, for example, was largely structured as a "ranch school"– classes were held in the evenings after the workday, on a wide range of subjects related to farm work, including mathematics (for planning crop rotations and calculating feed requirements) to soil structure. At another ecovillage, these meetings were open to outside visitors who paid for the opportunity to join the workshops, and which formed a portion of their income. Attending such events provided me with a perspective about how ecovillages oriented themselves to particular sustainability problems," as well as how they communicated the ways in which they set about to solve them. In total, I recorded 10 community workshops and 18 classes and lectures across two communities.

Another key aspect of participant observation involved walkthroughs of ecovillage sites. As discussed in chapter 6, ecovillage residents are accustomed to introducing new arrivals and visitors to the community space. In the process, residents narrate the relationships in between the various spaces and more-than-human others that comprise the ecovillage community. These narratives are instructive for understanding how individual residents conceptualize their communities and engage in place-making, but also for revealing how broader collective narratives emerge. I participated in 24 walkthroughs led by community members across 6 communities, with 18 walkthroughs recorded between Aldea

Ceiba and Rancho Bosque.

3.4.2 Semi-structured interviews

In total, I conducted approximately 65 interviews with ecovillage residents, founders, and visitors. Semi-structured interviews were particularly useful for getting "back stories," or allowing interviewees to elaborate on the motivations and experiences living in the ecovillage, including challenges and successes. Through these discussions, residents were able to elaborate on their understandings of sustainable community, and to reflect on how their work with more-than-human others reflected these understandings. Interviews proceeded from guides developed beforehand, but remained open to addressing other topics as they arose during the interview and adapted to the particularities of each community. Most interviews were carried out after having developed a personal relationship with interviewees, often after at least two weeks or more of being acquainted with one another. As a result, specific questions that pertained directly to the interviewee's expertise or duties within the ecovillage were noted down before the interview and informed how interview questions were adapted to the participant. Interviews ranged between 30 minutes to 90 minutes, with an average of approximately 45 minutes. At Aldea Ceiba, interviews were carried out twice with several long-term residents during a research scoping trip in 2018 and later during extended fieldwork in 2019.

The ecovillages consulted for this research tended to be composed of two groups of people: residents and/or founding members, and visitors or those who lived in the communities on a more temporary basis. However, this distinction does not capture the diverse range of the kinds of ecovillage inhabitants, and it is more accurate to characterize ecovillage residents as existing somewhere on a spectrum between the two. So-called "permanent residents" often visited and stayed in nearby cities for periods of time in order to maintain jobs. Others spent a good amount of time during the year traveling, for both leisure

and employment–for many community members, seasonal agricultural work in the United States presented a regular source of supplementary income. The fluctuations of ecovillage populations complicate attempts to determine or appropriately sample a "representative" population of community members; rather, all ecovillage residents who consented to an interview were included in this analysis.

The collection of interview data conformed to the ethical standards of informed consent. Research participants were verbally apprised of the purpose of the research and the scope of the interview questions, and were also provided with a printout of the research description, participation agreement, and my personal contact information. Research participants indicated their willingness to participate either with a physical signature or verbal assent, which was recorded at the start of each interview. Further, identifying information of research participants (and to the extent possible, communities themselves) is anonymized or abstracted throughout the dissertation, and pseudonyms are used for direct quotations.

3.4.3 Multispecies Mapping

In addition to semi-structured interviews, two "multispecies mapping" workshops were held in two communities where longer periods of field research was carried out (Aldea Ceiba and Rancho Bosque). Each workshop (1.5-2 hours) asked assembled residents to represent their communities as a "map" of interconnections between human and more-than-human participants, based on their own situated perspectives within the community.

The format of these workshops was adapted from participatory mapping in geography and environmental anthropology, as well as the "fuzzy cognitive mapping" approach (Özesmi and Özesmi 2004). Participatory mapping has long been a strategy for documenting indigenous spatial and ecological knowledge, and seeks to "transform cognitive knowledge into map, graphic, or written form" (Herlihy and Knapp 2003). "Fuzzy cognitive mapping,"

on the other hand, asks research participants to represent a "qualitative model of how a given system operates," representing both "defined variables and the causal relationships between variables" (Özesmi and Özesmi 2004, 44). Forms of this kind of causal mapping have been particularly successful in documenting how farmers understand the relationships between more-than-human others and particular outcomes in agricultural spaces (Fairweather 2010, Rajaram and Das 2010, Fairweather and Hunt 2011) and diverse stakeholders' perceptions of ecosystems (Özesmi and Özesmi 2004).

The multispecies mapping workshops employed during fieldwork drew on the complementarities between these two strategies. Like participatory mapping, my role as a researcher was not to elicit specific points of spatial data, but to act as a facilitator for establishing the objectives and terms of the mapping exercise. Beyond the initial prompt of representing the beings and relationships that were important to their role or work within the community, participants were afforded the creative liberty to represent these relationships in whichever way they saw fit. In both communities, residents took ownership of the workshops by establishing the terms of the collective discussion following the individual exercise; in Rancho Bosque, for instance, participants decided to try to collectively interpret what each individual's map represented, before allowing the artist to describe the work in their own terms. As a result, both mapmaking workshops elicited a diverse array of spatial/conceptual renderings of each community, as well as fruitful inter-community dialogue about their collective practices and attunements to more-than-human others. The results of this workshop are discussed in greater detail in chapter 4.

3.5 Data Analysis

Analysis of ethnographic data was conducted both during and after fieldwork, following LeCompte and Schensul (1999, 12–13). To the extent possible, recorded interviews were indexed by particular spaces or beings that each participant referenced as

soon as possible after the conclusion of the interview, as well as key themes that emerged through the semi-structured format. This strategy is informed by what Morgan and Nica (2020) describe as an "Iterative Thematic Inquiry," (ITI) or the identification of meaningful patterns which are derived from qualitative data which are then used for interpreting the body of data as a whole. An ITI approach involves the process of generating themes using initial research questions as a guide, and revising or refining those themes in the process of field research (Morgan and Nica 2020, Srivastava and Hopwood 2009). In practice, this meant that additional themes relevant to each community emerged while carrying out semi-structured interviews and conducting participant observation, they were added to future interview guides, and previous interviewees were asked for clarification or explanation where necessary.

At the initial level of analysis, interviews were tagged and collated according to a) particular practices [e.g., tending, weeding, watering, feeding, cutting, cleaning] b) explanations [e.g., descriptions of agroecology, indigenous or traditional practices, permaculture, etc.], and c) overarching narratives [e.g., motivations, dilemmas, problems, unexpected insights, change of mind, etc.]. Interviews were also coded by the places [sheep pens, fields, forests, orchards, gardens, chicken coop] and more-than-human others discussed by each participant. As data was collected across research sites and organized in this way, patterns in how particular actors and places functioned in relation to broader narratives or explanations emerged. This provided a way to understand how more-than-human lives within particular ecovillage communities articulated with broader issues and problems that applied to each: deforestation and environmental degradation, the loss of biological and cultural diversity, or socioeconomic disparity. Identifying which more-than-human others were present in broader explanations or narratives, and how, provided a basis for further follow-up and investigation.

After fieldwork was concluded, semi-structured interviews were transcribed and translated from Spanish (when applicable) using Scrivener software. Relevant anecdotes and quotes that illustrated salient points in relation to the research questions were highlighted and noted at this stage (e.g., for "knowledge-place entanglements," instances where interlocutors engaged in "explaining" or "teaching" practices, particularly while referencing a particular area of their community. Patterns that emerged across research sites in the first stage of analysis were refined, and as new themes emerged, a coding scheme was iteratively developed. Findings from interviews were cross-referenced against fieldnotes, as well as further in-depth research on the environmental histories and ecological relationships that characterized each region. In the later construction of the dissertation, data corresponding to these themes was organized around the broader narrative "skeleton" threads derived from understandings of assemblage theory (DeLanda 2006; Li 2007; Anderson and McFarlane 2011). While assemblage theory forms a core theoretical approach in this dissertation, the possibility of arranging the presentation of data using this theoretical structure only became apparent in the drafting stage–thus, arranging analysis around these various "assemblage threads" was developed a strategy for narrating insights in a coherent manner, rather than guiding data collection in a positivistic manner.

3.6 Considerations and Limitations

3.6.1 Researcher Positionality

Carrying out effective qualitative research requires acknowledging one's own positionality as a researcher in carrying out data collection and analysis. Following Holmes (2020), I structure this exploration of my positionality in relation to three key areas: 1) the research topic itself, 2) the research participants, and 3) the broader research context and process.

My interest in ecovillage communities emerged from a confluence of factors and experiences. I cultivated a personal interest in practicing and experimenting with various forms of regenerative agriculture, particularly in urban spaces, during my studies at San Diego State University in the United States. After a visit to two intentional communities on the west coast of the US, I developed an interest in seeking out similar projects in Mexico, where I was at the time conducting research for my M.A. in Anthropology. An exploratory grant from the Tinker Foundation in 2014 permitted a visit to Jalisco state to visit three communities and associated projects to develop a sense of the sustainable community landscape in Mexico. The inspiration for this dissertation research blossomed from these early encounters and interviews.

While living in residence in each community, I took on different sets of responsibilities which varied depending on the context. In Aldea Ceiba, for instance, I took on the role as the community meal planner and chef over several months, aided by a rotating cast of volunteers or permanent residents. At Rancho Bosque, I also helped to prepare meals and make supply runs, while at Tierra Madre, I helped to provide veterinary care and watched the property while residents were occasionally away. While these tasks were sometimes outside the scope of research, they were not only necessary to perform in order to participate in community life, but also helped me to form and maintain relationships with individual community residents.

The realities of cohabitation with diverse sets of people–each with their own life experiences, motivations, personalities, and temperaments–also presented unique challenges to carrying out research. Staying in each community often meant living in close quarters with other residents, sharing spaces for living, cooking, working, or even bathing and sleeping.[39]

[39] Such was the case in Rancho Bosque, where several residents often shared a room with communal bunk-style sleeping arrangements, or in Aldea Ceiba, where residents camped or hung hammocks in close proximity to one another.

Frustrations and interpersonal frictions were not uncommon amongst residents, and could hinder my ability to speak with particular residents or broach certain topics in interviews even when not directly involved in such conflicts. During my time in each community, I witnessed romantic relationships begin, long term partnerships dissolve, and residents come and go. Each of these factors shaped the flows of community life, and hence the ways I was able to participate in it.

My positionality as an individual and researcher also influenced my relationships with more-than-human research participants. Learning to care for unfamiliar plant or animal species across multiple ecological and geographical contexts afforded me breadth, but not depth, of knowledge and skills. The relatively limited research period was also a constraint to cultivating a deeper understanding of working with particular species or developing relationships with particular beings. At Rancho Bosque, for example, I learned how to move sheep from stable to pasture, to prepare their food, to provide health checkups to ewes, and to castrate young ram lambs. Watching the ease and grace with which an apprentice facilitated a live birth or killed and butchered a sheep, however, was a reminder that my knowledge of sheep had not even begun to scratch the surface. In some instances, prior experience in agricultural settings or with particular species was useful for engaging with community residents and participating in their care practices: for example, my lifelong experience working with and being around European honeybees (*Apis mellifera*) proved useful for following beekeepers at Aldea Ceiba, or helping Tierra Madre to acquire and situate new hives. At the same time, this general knowledge was not sufficient on its own for working with the community's hives; learning the specifics, from where the hive tools were located to what plants the bees sought out on foraging expeditions, was an embedded, evolving learning experience.

Finally, my location to the research process itself was shaped by my personal background and current affiliations. As a White, US American woman with access to financial resources and a foreign passport, I often resembled the "expats" and lifestyle migrants from the US and Europe that comprised a portion of my research participants. Explaining the goals and purposes of my research could often be challenging, especially with research participants who had little knowledge of or experience in ecovillages. My relative enthusiasm for providing uncompensated agricultural labor was more than a bit puzzling to locals and outside laborers hired by the ecovillage community, some of whom had spent significant periods in or hoped to relocate to the United States, sometimes unsuccessfully. In the process of building rapport with key interlocutors, I approached my position of relative privilege from a position of transparency and openness. Where appropriate, I compensated interviewees for their time when participation in my research required additional time commitments within the community (if they were not permanent residents), or in terms of volunteer labor.

There are a few ways my positionality as a researcher impacted data collection. Because my function in most communities was as a volunteer resident, much of the time spent in each community was dedicated to working and adhering to the schedules of each community. Sometimes this proved to be a useful strategy for learning about aspects of livestock care or garden work that I would not have gained through cursory walkthroughs or tours on their own. Working alongside shepherds, gardeners, and chefs in different communities provided embodied contexts for learning about the sorts of problems or issues that ecovillage residents confront, and in this sense was invaluable for a multispecies ethnographic research approach. At the same time, these responsibilities meant that interviews and data processing often occurred outside of working hours, which impacted the kinds of research participants I was able to include. At Rancho Bosque, for example,

community leaders prevented interview access to certain residents, particularly hired laborers that arrived and departed the community each day; at Tierra Madre, interpersonal tensions between some hired laborers and the core residents made recruiting interviewees a fraught process. In some cases, prospective interviewees were not pursued if doing so would have jeopardized my ability to stay in the community.[40]

3.6.2 Selecting Ecovillage Case Studies: A Note on Research Design

Since I visited my first ecovillage in the state of Jalisco in 2015, interest in the ecovillage concept has increased remarkably with every passing year. Facebook groups like "Ecoaldeas Mexico," a group for those "*en busca de vecinos sustentables*" (in search of sustainable neighbors), have sprung up to accommodate those who are hoping to find an existing community in which to live, or to recruit members to their new community. City dwellers from Guadalajara or Mexico City, looking for ways to "get back to the land" and live more simply, relocate across the country to join communities that they are hopeful will be a place to lead a more sustainable life with like-minded individuals. Ecovillages and similar projects across Mexico have become tourism hubs in the backpacker community, drawing eco-activists from North America, Europe and beyond in search of sustainable paradises in warmer climes. Expats have flocked here, too, attracted by the low cost of land and what they perceive to be lower bureaucratic barriers, hoping to start their dream eco-community at a fraction of what it would cost in the suburbs of Ontario or southern California.

As I began to explore potential research sites for this project, I found the prospect of selecting research sites that would "exemplify" the ecovillage movement within Mexico not only difficult, but as I came to understand, counterproductive in the context of the focus of

[40] I discuss these experiences further in a forthcoming book chapter entitled "Sick in the Field" (n.d.)

this research. As Brombin (2019) notes, “there is no unifying definition encompassing the variety of experiences that compose the ecovillage movement. Many communities are documented but many more are not... some of them share spiritual paths of personal growth and collective awareness, [while] others are agricultural projects committed to self-sufficiency, resilience and self-management” (193). In Mexico, the ecovillage movement seems to be characterized by constant change–projects come together, disperse, and are re-formed at a rapid pace. Positions for volunteers to “come and help construct an ecovillage” or calls for co-founders were frequently posted in online networks. It was far rarer, however, to find communities like Huehuecoyotl, a community that is often regarded as Mexico's oldest ecovillage and which has received substantial attention alongside other global examples of long-standing ecovillage communities.

Because preliminary research indicated that there were more exceptions to the ecovillage “model” than exemplars, this research was adapted to “stay with the trouble” (Haraway 2010, 2016) of different styles and expressions of community, rather than developing narrow rubrics to evaluate sustainability or relative success. Karen Litfin (2016), who similarly spent a year of fieldwork in ecovillages around the globe, wrote that her site selection was based on such measures, which she defined by the parameters of “size, longevity, influence, prosperity, and small ecological footprint,” tied to the overall research focus of understanding “what works” in ecovillages (250). However, the ecovillages which I visited and lived in could hardly be said to have added up to a collective sense of “success” (at least in a traditional sense). At the time of writing, more than one of the ecovillages included in this study are still grappling with the loss of multiple founding members; another, which had just regained a sense of stability after losing a majority of their staff and residents before my arrival, has now faced another upheaval which has placed their future in jeopardy. Rather than excluding these experiences as outliers, I highlight these moments of disjuncture

and dispersal (particularly in chapters 8 and 9) as integral parts of community formation (and re-formation). In other words, I place my focus not on establishing a picture of "what works" in designing sustainable communities, but rather on the processes by which residents arrive at this understanding.

Bridge to Section I: Gathering

Section I consists of a pair of chapters (chapter 4 and chapter 5) that both speak to the theme of "gathering" in relation to ecovillage life.

In chapter 4, I trace out four lenses through which gathering might be understood that emerged from qualitative data: gathering people, knowledge, materials, and other living beings. As I discuss in chapter 4, these lenses are not the only way of viewing this process, nor are they mutually exclusive. Indeed, the ethnographic examples I reference in this chapter ("gathered," so to speak, from across the field sites that I engaged with during field research) reveal how gathering practices are not only a matter of selecting and combining different beings (as in a garden, or a farm); instead, socio-ecological and historical contexts are always brought to bear in the imagination and the enactment of sustainable imaginaries.

In chapter 5, I examine this messy process of bringing together a host of distinct forms of life, knowledge, and practice in the name of "sustainable living" by focusing on a single field site: the community of Tierra Madre. At the time of fieldwork (summer of 2019), Tierra Madre was in the process of establishing itself as an ecological community based in an extremely particular ideology and social ethic. By delving into the example of a community in formation, I explore how the community's ideological and epistemological foundations were reflected in their practices of building sustainable community. This chapter builds on insights from chapter 4, arguing that communities are formed through exclusion as well as inclusion, which in turn has consequences for the ways communities practice sustainable livelihoods.

Chapter 4. Gathering: Assembling More-Than-Human Communities

> "If you ask each one of us what a sustainable life looks like, you'd get completely different answers"
>
> Aldea Ceiba Resident, April 2019

4.1 Introduction

"It's difficult to imagine for someone that comes [here as a visitor], everything that was done...what that implies. To have water, to have electricity, or to have this table, in the middle of the forest." Gonzalo, a founding member of the Aldea Ceiba community, tapped his knuckles on the handmade log benches we were sitting on for added effect. It was early evening, and he was reflecting on the first days of the project's formation by the light of a solar-powered lamp in the communal *palapa*. "The only shade we had was the shade we made with the cut branches from the work…we made these little *nidos* (nests). A ton of lessons, or changes to the mentality, how we get things.... But it was beautiful. And satisfying."[41]

Gonzalo's description of his community's founding reflected a familiar process occurring throughout rural areas in Mexico in recent years. Prospective founders and residents of ecovillage communities, seeking more communal and ecologically grounded lifestyles, acquire land (often in rural or rapidly developing spaces) and begin to put their vision into action. Ecovillages in Mexico are founded and inhabited by diverse groups of actors: American retirees with pensions, millennial hippies from Mexican urban centers,

[41] Interview with Gonzalo, April 23, 2019.

European “voluntourist” backpackers, young farmers, small families, or lesbian separatists. Each resident brings with them diverse sets of skills, experiences, and visions of what a sustainable community might look like in practice. In producing sustainable communities, ecovillagers materially shape landscapes, agroecosystems, and fields of social relationships according to their own understandings of what an “ecological community” means and how it might function. If ecovillages are laboratories, then this chapter serves as the introduction of the lab report, tracing the ways that residents approach the experimental design process and begin to assemble the materials necessary for experimentation.

This chapter addresses the first research question of this dissertation, asking how ecovillage communities are differently assembled by their residents and how these configurations are underpinned by differences in how sustainable livelihoods are imagined (Murphy and McDonagh 2016). These different “sustainabilities” that emerge from distinct communities develop in relation to the situated perspectives of ecovillage residents, which are themselves inflected by a host of contextual (and deeply cultural) factors: socioeconomic status, nationality, educational background, or access to land and resources (among others). In other words, what ecovillagers care about and value in constructing sustainable communities–and further, how they project these cares onto more-than-human others–reflects (and is circumscribed by) their positionalities as social actors.

To explore how different understandings of sustainability produce different versions of sustainable community, I begin by conceptualizing the first stage of assemblage–gathering (Li 2007; Anderson and MacFarlane 2011)–as it relates to ecovillage design and construction. Drawing on discussions and semi-structured interviews with ecovillage founders and residents, I highlight five entities that emerged as central figures in the ecovillage assembly process: namely, people, knowledge, land, (financial) resources, and other species. I argue that “gathering” sustainable communities is a process that is deeply shaped by the

motivations and prioritizations of ecovillagers as they navigate and respond to the particularities of place. Some aspects of community gathering afford or implicate others, while other contextual factors might foreclose certain modes of practice, leading to complications and contradictions between visions for and the practice of sustainable community.

The themes that shape this analysis are by no means exhaustive or mutually exclusive; indeed, many of these are inextricably interwoven with one another. Bringing together different kinds of people also implies bringing together different forms of knowledge; likewise, the same contextual factors constraining access to financial resources might also constrain access to land, supplies, or the ability to care for specific kinds of animals or plants. While the gathering threads presented here help to understand similar processes occurring in each ecovillage community, they also reveal the countervailing priorities and paradoxes that are embedded in the assembly process.

4.1.1 Gathering People

How do people end up in ecovillage communities, and what factors influence how communities gather together over time? From discussions with ecovillage residents about their motivations for joining or visiting their respective communities, similar themes emerged: residents expressed, in their own ways, a sensibility that human relationships with the natural world are fundamentally damaged and deeply in need of repair. Some residents also see their involvement in ecovillage projects as a commitment to undertaking these repairs through intentionally shifting lifestyles. But beneath these broad similarities, ecovillage communities are deeply individualized constellations of actors, each with their own distinct personalities, skills, hopes and fears about the future. These distinguishing characteristics are crucial in producing the diverse spectrum of sustainability imaginaries represented by different communities.

Each ecovillage consulted for this research was initiated by an individual or small group of individuals, each with different imaginaries and goals for constructing sustainable communities (see "Research Sites" in chapter 3 for further discussion). Founders might have substantial connections to resources that are essential to the construction of a community– often, this means ownership of land, sufficient funds, or connections to both. At Rancho Bosque, for example, one of the primary founders of the community was Jens, who had previously worked as a development professional in Mexico, and had access to both the financial resources and social connections required to legally purchase land in the country.[42] As was the case with Aldea Ceiba, groups of founders often know one another socially prior to deciding to form a community (e.g. families, friends, or acquaintances with shared interests), and instigate a resource-sharing scheme (land, money, materials, skills) in order to get a project off the ground. These early residents often (but not always)[43] continue to be central figures in the community as it grows and have an important say in the tone of community life, in part owing to their connection to these resources.

As ecovillages grow, they also become products of the multiple, overlapping motivations and priorities of their human residents. "Resident" is an admittedly open-ended category, and the nature of this residency ranges in scale and degree: this might include "buying into" the project by making a substantial financial contribution, constructing a primary residence on the community's land, or contributing labor or time to the community over a fixed period. In some communities, the process of accepting new members is formalized: there might be a structured process of deliberation undertaken by existing community members, sometimes followed by a legal agreement (although this is not always

[42] Due to complex legal arrangements required for purchasing land (specifically, former *ejido* land, briefly discussed in the introduction chapter) meant that social connections to Mexican landowners were extremely important.
[43] In every community visited, members of the original "founding group" had at one time or another left the project.

the case). At Tierra Madre, for instance, residents financed the construction of their own houses on parts of the community land, but did not have a formal contract with the primary landowner delineating their tenancy rights or financial obligations.[44]

In contrast to the normative understanding of a village as a site of permanent settlement, each of the communities were characterized by flows of various actors and kinds of project participants, leading to drastic demographic changes and reshufflings. Ecovillage residencies can last for varying lengths of time and in various capacities. While some communities remained largely closed to outsiders (save for a few days, when planned tours or structured visits were allowed) others regularly hosted volunteers, who exchanged their labor for accommodation. Some communities ask that volunteers commit to a particular length of time for these stays; Rancho Bosque asked for a minimum stay of one month, while Aldea Ceiba sometimes welcomed paying volunteers even if for only a handful of days. Others, like Tierra Madre, accepted volunteers or paying guests for predetermined periods. Occasionally, volunteers or short-term visitors decide to prolong their visit: personal relationships, work opportunities, or developing a love of the community or the landscape are all reasons people decide to make a home in an ecovillage community. Occasionally, there are just as many (if not more) temporary residents relative to "permanent residents" or founders in a community in any given period; during the busy tourist seasons in spring, the *semillas* of Aldea Ceiba were outnumbered by volunteers and visitors three to one.[45] Directing, accounting for, and caring about temporary visitors requires significant emotional investment, and high turnover of residents (both short and long-term) can result in significant losses to institutional knowledge. Overall, however, ecovillage communities largely benefit from (and indeed, some wholly rely on) the participation of volunteers and residents that

[44] The lack of a contract significantly increased tensions when one resident who had invested a significant sum in the construction of their house decided to leave the project, but who had no formal legal right to a return of this investment (or ability to transfer ownership of the house). Field Notes, August 2019.
[45] Field Notes, March 18-25, 2019.

support their stay through volunteer labor.

As ecovillage communities grow and the visions of the founders expand, sustainability narratives become central in the process of attracting new members and visitors. All ecovillages visited for this project maintain some form of an online presence, such as a website or social media accounts, to communicate with prospective residents, volunteers, and paying guests. External platforms or forum sites, such as HelpX, Worldpackers, WWOOF, or Facebook help to connect prospective traveler-volunteers with different communities, and are important spaces for signaling community values and expectations. Aldea Ceiba's Facebook page declares, for example, their "deep-rooted values" of all forms of life, cultures, and traditions, as well as their goal of joining a larger global network of sustainable communities.[46] Similarly, Rancho Bosque's online profile expressed their goal of living a "life that is more healthy, sustainable, in harmony with nature for the good of us as well as those that come after us, fulfilling our responsibilities as humans"; they also note that they use anthroposophical principles in their approach to farming[47]. These examples reveal the importance of maintaining a digital presence as tools for connecting with the broader ecovillage community as well as potential supporters, and show how sustainability narratives become a part of that messaging.

As ecovillage projects develop and further refine their values and goals, these public narratives about their community shapes the kinds of people that they attract. In addition to framing themselves as an ecovillage community, Rancho Bosque also presented their community as a training center (*centro de capacitación*) for local youths who had an interest in developing their own holistic farms–thus, in addition to foreign volunteers and other visitors, they also attracted a good deal of young people from local communities. Rodolfo

[46] Facebook profile, accessed August 5, 2019.
[47] Workaway Profile accessed February 12, 2020.

(who served as de facto social media manager) also expressed his hesitation for accepting requests from visitors that were vegetarians, and made sure to emphasize the centrality of animal care to the community in these initial communications. “People get here and start working with the little pigs we have, but then they don't like it when they hear an animal that touches the electric fence. They get really upset when we say that we have to kill them!”[48] In contrast, Aldea Ceiba’s vision of their community as a center for cultural exchange and alternative agriculture often meant that they had a rotating crew of artists, performers, or skilled workshop leaders in residence. The makeup of individuals subsequently affects the general tone of daily community life. While life at Rancho Bosque was highly scheduled, with specific periods for work, mealtimes, and lectures, Aldea Ceiba working life was less regimented, frequently adapted to emergent needs, with efforts distributed across a range of tasks and projects. In this way, ecovillage visions iteratively shape (and are shaped by) the kinds of residents that join each community.

Geographic and social barriers sometimes draw permanent residents away from the community for protracted periods of time. During my stay at EcoMonte, for example, personal circumstances took several residents who had recently built houses on the land away to a nearby city for work. The three-hour bus ride to the city, and the location of the community at the top of a winding mountain drive outside of town, meant that most permanent residents considered the ecovillage a sort of weekend home. Even Paco, a young man who was determined to make a home on the project's land with his wife and children, traveled often between the community and the nearby town for spare parts, buying food, and taking on odd jobs.

Other residents consider the ecovillage “home” for a time, with the intention of eventually moving on to other opportunities. At two communities, young residents were

[48] Field Notes, January 7, 2019.

recruited from nearby communities to serve as in-residence "apprentices," where the ecovillage community became a primary residence for a fixed period. These apprentices lived, worked, studied, or socialized in the community for weeks or months at a time (up to a period of about two years), traveling to their family homes periodically. These apprentices were often motivated by a desire to develop their own "ecological" agroenterprises one day, but lacked the means to study the subject in a formal setting or acquire their own plots of land. One young apprentice at Rancho Bosque was a mother to two young children, whom she had left in the care of her maternal family and returned to visit often. Her ultimate goal, she told me, was to return to her hometown and found a small organic garden and dairy, "applying the knowledge" that she had gained as an apprentice.[49] Like many of the other apprentices who lived there, she was able to support her stay through a monthly stipend offered through the Mexican government for career training (discussed further below in "Gathering Funds").

Many "permanent" members of the community were also highly mobile, traveling often for other kinds of work, recreational pursuits, or visiting family. Some ecovillage residents were professional athletes or artists whose performances or competitions took them away from community life for weeks at a time. More affluent residents traveled for several months on end, while others traveled to other parts of Mexico or the United States as temporary invited workers or on dual passports. Ecovillages were often located away from urban centers or in more remote areas, requiring residents to travel long distances for work or visiting family. Sometimes, these responsibilities prevent prospective residents from maintaining their residences in the community (despite their best intention). For example, Antonio was an important figure in the management of Rancho Bosque's gardens, but spent weekends in a nearby city with his wife and young daughter, who lived with his family.

[49] Interview with Y, February 22, 2019.

Eventually, his plan was to follow the example of Don Bernardo, a man who worked daily with the pigs and lived in a small house with his family near the community's entrance.

Participation in ecovillage life is not exclusive to its residents, but also involves people from nearby communities or cities who work in ecovillage communities or consult its residents. Hired help (often, but not exclusively, men from nearby towns) perform tasks like garden maintenance or construction. In Jalisco, one community is attached to a small business on the property (an organic food products label, distributed to regional markets) which was founded by the owner. Operations of the business, from garden maintenance to packaging, were handled by skilled laborers who came from a small community kilometers away. At EcoMonte, the majority of daily interactions were with a small crew of construction workers who were building cabins perched on the hillside that would be rented to tourists. The men were not considered residents *per se;* they arrived each morning and left in the evenings to their homes in the town, where they moonlighted as a Ranchera band for hire. However, their daily presence within the community meant that they had a more detailed and up to date knowledge of the community's current state than nearly anyone: whose horses had broken a fence, whether or not the ducks had eaten recently, or where a snake had been found in the untended grasses near the chicken coop. Access to this information meant that these workers were vitally important to residents that spent more time away from the community, who relied on them in order to maintain and care for aspects of the community that they could not.

Conflicts and tensions inevitably arose from living together. Different perspectives about how to accomplish community goals converged and clashed, despite attempts at developing conflict resolution strategies, such as consensus decision-making. The internal social dynamics and “culture” that developed for managing these conflicts differed greatly between communities: Aldea Ceiba permanent members regularly solicited opinions and

feedback from temporary residents through community meetings, while at Tierra Madre, group meetings were called only when interpersonal conflicts had escalated to the point that some founding residents considered leaving. While Rancho Bosque held nightly lectures and group meetings, community leaders also imposed stricter rules for residents after a number of romantic relationships were sparked between visitors and volunteers and residents; according to the leaders, such liaisons were potentially damaging because they diverted attention away from the primary goals of the project and/or impacted the reputation of the project in the eyes of the local community.[50]

Interpersonal conflicts, departures, and high turnover of ecovillage residents had consequences for each community's understandings and pursuits of sustainability as an embodied practice. Not all ecovillages value inclusivity in their approach to accepting new residents; in other words, practices of exclusion (of drawing lines between the community and the outside world) also constitute forms of community construction [this is discussed in greater detail in chapter 5]. Occasionally, differing perspectives–about both mundane tasks in day-to-day life, as well as broader understandings about the community's key goals–sparked new debates that in turn led to new community-wide practices (as I discuss in "Managing Death" in chapter 8). Other times, residents left the community altogether, sometimes seeking out new ecovillage communities, and other times not (see "Death of the Ecovillage" in chapter 8).

These instances reveal a co-constructive link between the kinds of people that inhabit ecovillage communities and the narratives that they subscribe to; just as certain narratives and ways of being in community attract different kinds of human residents, the people that live (and choose to stay) in ecovillages also influence the narratives and practices at play in each community. In the next section, I explore how various forms of knowledge and

[50] Field Notes, Community Meeting, February 11, 2019.

practices constellate within ecovillage communities.

4.1.2 Gathering Knowledge

How did residents use and apply particular forms of knowledge in different contexts, and how did these understandings influence ecovillage practices over time? From observations in both Rancho Bosque and Aldea Ceiba, several key factors emerged that appear to influence the agricultural strategies that each community employed, as well as residents' receptivity to alternative ways of knowing. These included the networks of prior relationships and individual dispositions of ecovillage founders, the amount of time residents spent in place, and how each community framed broader issues of knowledge loss and recuperation in terms of the goals of their respective projects.

In designing and maintaining their communities, residents bring with them diverse levels and sets of experience in a wide range of fields. At Aldea Ceiba, many community residents have studied fields such as biology, sustainable development, anthropology, or architecture at the university level. In their “past lives” before joining communities, residents and volunteers were employed or trained as chefs, carpenters, apiculturists, medical professionals, or social media managers. In most cases, residents had prior experience in projects relating to community development and/or organic agriculture, and draw from these diverse experiences to their daily practice inside the community.

Before founding a community, ecovillage founders might seek out existing communities to understand how they function in practice. In the process of searching for an area of land to found their community, the members of Aldea Ceiba had been in contact with other similar projects elsewhere in the peninsula, and had themselves hosted founders (both prospective and not) of other projects in the region. A handful of their members had visited Huehuecoyotl, widely recognized as Mexico's oldest ecovillage, and had followed their work for years. Many ecovillage founders participated in courses or workshops held by other

ecovillage communities or organic agriculture practitioners (such as agroecological "demonstration centers" or educational farms), sometimes traveling several hours or states away to take part in short courses. The topic of these workshops largely fell into two categories: in *bioconstruccion* ("natural construction," or building with adobe, bamboo, and other locally available and natural materials), or courses that covered specific agricultural skills (either focused on a particular species or agricultural method). Interestingly, founders of ecovillages consulted for this project often followed the public pages of one another's communities even if they had not been personally acquainted, reflecting an awareness of other communities and their practices.

Each of the communities visited practiced various approaches to two fundamental aspects of ecovillage design: community organization and agricultural strategy. By community organization, I refer to the ways that individuals collectively decided or assented to handling community affairs, from land ownership and labor arrangements to conflict resolution; agricultural strategies, on the other hand, refer to named sets of approaches to alternative agriculture (including biodynamic agriculture, agroecology, and permaculture). While these two aspects may appear to be unrelated, each of these strains of eco-agricultural thought have distinct epistemological legacies, which in turn orient their practitioners towards particular patterns of sociality. For example, biodynamic agriculture–practiced by Rancho Bosque and another community in formation nearby–is one branch of a broader esoteric philosophy known as Anthroposophy. The thinker behind Anthroposophy, Rudolf Steiner, wrote treatises on subjects from grazing and beekeeping to education and dance, threading through multiple domains of life with a common understanding of how universal forces are involved in human interactions with the environment (Steiner 1995). Similarly, the principles of permaculture, such as "produce no waste" or "integrate rather than segregate," do not only apply to the design of agricultural landscapes, but to social organization as well

(i.e., not "wasting" people through disrespect or lack of value, or integrating multiple perspectives in a debate). These articulations between agricultural strategy and approaches to social organization mean that the form of agriculture practiced–and the community's body of agricultural knowledge in general–is deeply shaped by and rooted in the community's understandings of sustainable practice.

Ecovillage founders encounter, take up, and prioritize different kinds of knowledge based on their individual backgrounds and inclinations. Sometimes, this exposure to a particular form of agricultural practice comes through these epistemological linkages described above. After years of running Rancho Bosque as a conventional family farm, Jens encountered biodynamic agriculture on a visit to his native Germany, where he visited a relative who worked at a Waldorf school. "I had some curiosity about biodynamics, because I saw the way the children in this school were being taught about nature in their little garden there, and how they learned to see the spirit of things,"[51] he told me. Biodynamic agriculture was attractive not only because it blended scientific and spiritual understandings, Jens explained, but also because biodynamics could be economically viable; there was a certification scheme with clear guidelines and preparations, and an international market for those certified products.[52] But perhaps most importantly, biodynamics also mapped onto his existing experience with rotative grazing. Other founders assemble bits of knowledge from online sources and/or social media, either through individual research, modeling practices off infographics from Facebook, how-to videos on YouTube, individual research, or advice gleaned from neighbors, friends, or external experts.

Where this knowledge was gathered depended largely on the social backgrounds of the ecovillage residents, and their level of previous experience with either agricultural or

[51] Interview with Jens, January 16, 2019.
[52] *Ibid*.

alternative forms of community organization. Ecovillage founders from elsewhere in North America and Europe had often participated in events or workshops in their home countries before beginning a project in Mexico. Many of these founders have participated in (or hope to participate in) Permaculture Design Courses (PDCs), a structured module that introduces participants to the principles of permaculture and how to apply them, culminating in a landscape design based on the practice and a certificate. As permaculture has become increasingly mainstream in recent years (at least within alternative community circles), PDCs have become one of the more visible (and expensive) options for gaining practical experience in ecovillage agroecosystem design. On the other hand, no ecovillage residents from Mexico or elsewhere in Latin America had participated in a course that was explicitly marketed as a PDC. Instead, many had had previous experience with agriculture (as a profession, hobby, or both), or had visited other communities established by other Mexicans.

Some of the ecovillages consulted were linked by common references to other well-known ecovillages and agroecological demonstration centers within the country. One well-known community in Veracruz remains closed to outside visitors, unless they are participating in one of the regular workshops they hold on chicken care, agroforestry, or "eco-technology" (solar panels, water filtration, or the like). This center is widely regarded as one of the most intensive education centers in Mexico, and permanent residents from nearly all communities discussed in this dissertation had taken one or more courses here. However, this renown only seems to travel in particular circles: courses are held in Spanish, and while less expensive than many PDCs ($5000-$8000 MXN [250-350 EUR]), many of the non-Mexican residents of ecovillage communities were not acquainted with the center. Both Aldea Ceiba and Rancho Bosque sought to replicate elements of this setup, and modeled their communities as centers for educational training or exchange. As part of fieldwork carried out for this dissertation, I participated in several of these courses offered to external residents

(both from the well-known ecovillage center, Aldea Ceiba, and Rancho Bosque), ranging in topics from metalworking, Tai Chi, beekeeping, and coffee processing, among others.

Another important factor was the amount of (consecutive) time residents had spent in the community. This may appear to be an obvious conclusion, especially if it is assumed that there is a linear relationship between the amount of knowledge acquired of a place and time spent there. The variable of "time spent," however, is more fluid in the context of both communities, each of which had a high degree of resident mobility and turnover. In Aldea Ceiba, for instance, several core members occasionally spent weeks or months at a time traveling or working elsewhere, while other residents were embedded on a more continuous basis. Ecovillage residents that spent shorter amounts of time in the community were also limited in their ability to assist in daily work. Volunteers who arrived in ecovillages only for a short time (several weeks, or in some cases, only a few days) often had difficulty learning the intricacies of caring for their assigned areas, regardless of the level of enthusiasm for the task or experience in other agricultural settings. Visitors from Europe and other North American countries, for example, had often never encountered "exotic" fruits like papayas or bananas outside of supermarkets in their home countries; other creatures, such as the *Melipona beecheii* bee, were often being encountered for the first time. Seemingly innocuous tasks, such as watering or weeding garden beds, required a certain degree of familiarity with cultivated species and a discerning eye, as volunteers in Aldea Ceiba discovered when distinguishing between grass and corn seedlings in the community's *milpa*. At Rancho Bosque there was a high turnover of volunteers, who often stayed for several weeks to a handful of months, as well as apprentices and other long-term residents. Each of these departures were accompanied by necessary shifts in daily practices–responsibilities were shuffled to other available residents, and the particularities and details of tasks were either communicated to those that took them over, or were lost entirely.

Temporary visitors also bring with them their own kinds of knowledge developed in other places, and negotiate these experiences in the contexts of their new communities. One volunteer at Rancho Bosque had university degrees in forestry from Europe, and another had participated in agroecology projects in their hometown in Japan. Sometimes visitors expressed parallels between experiences they had in other farms or ecovillage projects, but other times, there were obvious disconnects. One resident of Aldea Ceiba remembered a French visitor who had arrived in the early days of the project, and who had tried to convince the *semillas* to experiment with a form of gardening he knew as "dry farming," which prioritized the cultivation of drought-resistant plants. "It was nice," one of the residents who worked in the garden recalled, "but that's not really a problem we face here," noting that the visitor had come during the dry season, unaware that in other months the key issue was *too much* rain. In the end, the *semillas* offered him a small area off the path to the *cenote* to experiment with planting *nopal* (cactus). A month after the visitor's departure, the cacti that remained in the soil had largely wilted under the dense canopy that had developed as the rainy season began. "We kind of forgot this was his project after he left," explained one resident, who had pointed out the plot to me. "He was the one that cared about this spot and knew what to do, and he took that away with him when he left."[53] Departing residents take knowledges and practices, with them when they leave.

In both Aldea Ceiba and Rancho Bosque, residents described the purpose of their community in terms of a broader loss of generational knowledge as it pertained to interpreting and managing the environment. However, the responsibility for this generational knowledge loss was framed quite differently in each community. Rodolfo, a young man who managed Rancho Bosque's garden plan, lamented the widespread loss of agricultural knowledge that had occurred in only "two or three generations" in Mexico and other

[53] Community Walkthrough [recorded audio], March 26, 2019.

countries in Central America: "Here, the apprentices have the chance to *recover* this knowledge, and build character at the same time."[54] Rodolfo, who had earned a degree in agronomy and often taught evening lectures to the other residents, described his role in the community as a sort of knowledge "guide" (*guia*): "when you have a lot, you can share a lot," he reflected. Rodolfo understood his role as "transferring knowledge piece by piece," with the aim of "reactivating and reawakening" knowledge in the apprentices over the course of their multi-year residency.[55]

Valorization of indigenous and local knowledge is in many ways baked into the fabric of ecovillage discourse. In Aldea Ceiba, for example, this was evidenced by a strong motivation to engage and enter dialogues with neighboring indigenous communities in the conception of their project. "This is their land, so in a way, this project is for them," Gonzalo told me during his discussion of the community's goals.[56] Relationships with members of the local community are centralized in the daily work of Aldea Ceiba residents, from volunteering in the local primary school, organizing a sewing and crafts cooperative, to exchanging seedlings, plant cuttings, and gardening tips with their neighbors. At the community of EcoMonte, a hodgepodge of indigenous traditions was represented in the design elements of the community. The road to the community was lined with boulders with etchings of animals in a Maya style, and a sauna was being constructed in the shape of an Olmec head. During my first visit to the community, morning and evening gathering times were marked by blowing a conch shell, an instrument associated with multiple indigenous traditions throughout Mexico, in each of the four cardinal directions. For these residents, the trappings of indigenous cultures fit with the goal of founding an ecological community that was "closer to nature."[57]

[54] Interview, January 12, 2019.
[55] *Ibid.*
[56] Interview, April 23, 2019.
[57] Field Notes, October 10-13, 2018.

Even if ecovillage residents already have direct experience in practical work that ecovillage life requires (such as gardening or natural construction), all ecovillages sought out the knowledge of local residents who lived beyond the community at one time or another. Residents of nearby communities not only had in-depth knowledge of the local landscape, having lived there all or most of their lives, but also of the professions that ecovillagers were trying to become proficient in–namely, construction and agriculture. When apprentices at Rancho Bosque were asked "if you don't know something, where do you go to figure it out?" they overwhelmingly cited the influence of Don Silvio and Don Julio, two men who had lived on the land or in neighboring communities in the mountains for decades, and who now worked in the community on a daily basis. Similarly, Aldea Ceiba residents strongly emphasized the importance of their relationship with the local Maya community that lived nearby, pointing out the influence of Don Pedro, a caretaker of the land before Aldea Ceiba had been founded there. Despite their cumulative decades of experience with themes like natural building and gardening, the *semillas* regularly expressed that the longevity of their project depended on collaborations with those that knew the land better than they did. As one long term resident told me, "it came to a point where it was too risky to do it by ourselves– we needed not just extra hands, but 'knowing hands', hands that knew how to work this land. Victor, he has basically guided us...since day one. He has done a bit of everything in his life, and knows how to live on the land–to survive. And not only to survive, but to live well!"[58]

Gathering knowledge from "expert locals," however, was not always a direct or straightforward process. One Aldea Ceiba resident noted that earning the trust of Don Victor, the longtime caretaker of the land,[59] had been a significant challenge. One founding resident explained: "It wasn't as if he was necessarily hiding information, but if we came across

[58] Interview with E., Part I. June 18, 2018

[59] The land had been purchased years before from the previous owner, a local, by a family member of one of the residents of Aldea Ceiba, but had been maintained and used by a local caretaker for much of this time.

something on the property, and mentioned it to him, he would simply confirm it, like he knew it was there. One time we found a well that was hidden in a pile of brush, so a nice source of fresh water; we told him, and he would just say 'oh, yes'. It was clear that he wasn't going to give up everything at once!"[60] This anecdote evidently left a mark on the community, as it was repeated by three of the founding community members in separate exchanges. The story seemed to hold poignance for the residents because it gestured to the countless ways in which they did not know, or were still getting to know, their surrounding environments.

Ecovillage residents generally valorize indigenous knowledge, but the degree to which communities actively engaged with indigenous environmental expertise or traditional practices depends greatly on the community and its context. Aldea Ceiba maintained a separate home in the nearby Maya community, and worked diligently to build relationships with their neighbors to connect to local sources of expertise, particularly with cultivating local plant species. In other communities, residents maintained a distant (but abstracted and generalized) respect for traditional practices without engaging directly with those communities. At Rancho Bosque, the long history of colonialism and livestock agriculture in Veracruz led some residents to regard the indigenous occupants of the land as relics of the past. When pieces of pottery, obsidian points, and other archaeological finds were uncovered during the construction of new terraces for coffee plants at Rancho Bosque, they were a momentary curiosity; but ultimately, construction continued unabated, the pottery sherds tossed aside as compost was turned with the excavated earth (Image 1).[61] At EcoMonte, indigenous cultures from throughout Mexico were decoratively referenced in various elements of the community design, including carvings of Maya deities on boulders lining the

[60] Interview with A., April 23, 2019
[61] All photographs by author unless otherwise specified.

path to the community and a *temazcal* (traditional sweat lodge) constructed from concrete in the shape of an Olmec head, a distinctive artistic theme of the pre-Hispanic indigenous group from Veracruz (Image 2).

Image 1. A stone carving unearthed in the garden of Rancho Bosque, believed to represent one of the Centzon Tōtōchtin, one of a group of divine deities associated with fertility and drunkenness (Miller and Taube, 1993).

Image 2. Olmec colossal head, Anthropological Museum of Xalapa.

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These instances reveal, in part, the connotative relationships between indigenous culture, environmentalism, and notions of "living in harmony" with the environment, a link that some communities incorporate as part of their broader messaging. For instance, Aldea Ceiba writes in their community manifesto that: "humanity is indebted to the original peoples of the world, guardians of the knowledge and practices that have created and sustained civilization. Therefore, it is crucial to preserve the wisdom of our ancestors… the self-determination of the indigenous peoples of Mexico and the world is a just and necessary cause to restore balance" (Appendix G, Item 4). References to traditional indigenous practices also surfaced during one evening lecture at Rancho Bosque, when Rodolfo gave a talk to the younger apprentices on the history of agriculture. He pulled up a PowerPoint slide with two images: one of an Amazonian indigenous community, and the other of a cave painting. "Hunters and gatherers," he began, "had a healthier diet, lived much longer

lives...there was demographic control, they were in balance with their environment." He flipped to the next screen, that had an image of a small child staring up at a wall of dairy products in a modern supermarket. "We can see that today, we are not connected to our environment like they were in older times," Rodolfo explained to a rapt classroom. "That is what we are trying to do here, to get back to this with our work."[62] Instances like these reflect how some communities draw on cultural associations between "indigenous" or "traditional" and "ecological" to narrate the goals and values of their project, even if they do not explicitly engage with such practices or forms of knowledge.

While Mexican indigeneity is frequently referenced or invoked in ecovillage communities throughout Mexico, this does not always mean that residents accept or value *all* kinds of traditional practices. In Yucatan, for example, a lack of waste management infrastructure often meant that plastic packaging was often used to start cooking fires. During a beekeeping workshop, Gonzalo referenced the practice when explaining how to use a smoker (a tool that is filled with burning material to produce smoke used when opening a hive), adding jokingly that burning dried grasses instead of plastic bags was one of the few ways they tried *not* to follow "traditional Mayan" beekeeping practices.[63] Occasionally, ecovillage residents sought to bridges these gaps through their personal interactions with local community members or by developing environmental education initiatives. Angela, a Aldea Ceiba resident, was especially devoted to the issue and often spent afternoons in the local primary school along with her partner educating young children about the impacts of pollution on wildlife. She lamented how commonplace it was to toss trash on the sides of roads or that *cenotes* were being used as dump sites, and made a point to delicately explain that burning plastic was harmful if breathed when she saw local residents starting fires with

[62]Classroom lecture, February 13, 2019.
[63] Field Notes, March 29, 2019.

shreds of plastic packaging (appeals that, while often good-naturedly acknowledged, were not always successful). These moments evidence in part how ecovillagers selectively engage with certain practices of residents, especially if they do not align with already-existing community values.

4.1.3 Gathering Land

In many instances, ecovillage residents are not from the region where they initiate a project; because of this, "gathering land" to found a community is one of the most fundamental stages of founding an ecovillage. As I discussed in chapter 2, the social and legal history of land tenure in Mexico has prompted the emergence of two oppositional trends: the inability of rural farmers to earn a livelihood from lands which they possess rights to collectively work, and the relative purchasing power of prospective landowners from urban centers or foreign countries. As a result, some residents expressed a sense that there was an abundance of cheap tracts of rural land available, so long as someone knew where to look. However, a patchwork of legal protections for *ejido* lands that apply to their sale continue to apply, and complicate abilities to transfer ownership to both Mexican and non-Mexican residents alike. While a number of factors influenced the places that ecovillage residents chose to found their communities, not least of which was their ability (as outsiders) to purchase the land.

The unequal power dynamic produced by differential access to land (among other resources) at times resulted in tensions and conflicts between ecovillage residents and locals. Some of these conflicts arose from misunderstandings of the bureaucratic process for transforming *ejido* lands into those that could be sold to private owners. While the land that became Aldea Ceiba had long been privately owned, it was managed, cared for, and used by an indigenous man from the nearby community. While community members had built a strong personal relationship with the man and his family over time (and continued to allow

them access to the land, while compensating their help on community projects), one founder remembered the man's strong misgivings about the fledgling community moving in. At Tierra Madre, by contrast, residents were deeply apprehensive about developing relationships with the locals they employed outside their community's walls, electing instead to focus on developing relationships among residents.

Ecovillage visitors and even residents express the difficulty of centering their life permanently around the same geographic area, and many choose their location based around mobility options. Mariana, a Mexican national raised abroad, her partner, and several friends who decided to form an ecovillage community had considered land in a few key areas–near the coast by Puerto Vallarta, or up north in San Miguel de Allende.[64] but had decided on the north shores of Lake Chapala because of lifestyle fit. "Nobody who wants to come and be part of this community wants to leave our 'actual life' behind," Mariana told me. "To have a self-sustainable ecovillage, where you don't need to work outside, it takes so many years–and so everything that we want to be in the ecovillage we can have while working our normal jobs, and then come here–to go to a concert, a cultural center. Nobody wants to be isolated completely, and forget the world...".

Mariana and I had met in the center square of town called Ajijic, a place that she and her collaborators had decided was the best of both worlds: both "off the grid," but still within commuting distance from Guadalajara, the country's second largest city. Ajijic was unlike many parts of Mexico I had been before, with its broad manicured lawns, burger restaurants, and English on the signs and heard in the streets. Yet Ajijic, like its neighboring towns along the coast of Mexico's Lake Chapala, had become a central site for the ecovillage and co-housing movement in Jalisco. As Mariana told me of the difficulty in finding investors and

[64] These two cities are, like Ajijic, known for being densely populated by foreign migrants from wealthy countries.

future neighbors for her budding Ajijic ecovillage, “a lot of people are looking for this kind of lifestyle...but from all the ecovillages I know, nobody, or nobody who is forming this ecovillage, wants to leave their 'actual' life completely.”[65] To this end, a consistent comment heard from migrants who were living in or in the process of developing ecovillages, particularly in Jalisco, was the proximity to an international airport.[66] In certain senses, air travel is viewed as something of a necessary evil, despite concerns about negatively impacting the environment with carbon-heavy travel–“our family lives in the northeast [of the United States],” one woman who had moved to a Jalisco ecovillage with her husband told me. “What are we supposed to do, not see them ever again?”[67] Location within the country was also a significant concern for ecovillagers of Mexican origin; many were originally from or had connections to large urban centers such as Mexico City or regional capitals.

While the ability to “disconnect” from urban life is a theme that is emphasized often as a motivation for founding an ecovillage community, many ecovillagers rely on outside linkages to sustain themselves. This is either as a means of generating income through the sale of goods produced in ecovillage communities, or to gain additional income that could be funneled back into the community. The importance of location, and the interchange with local urban centers, was touched on during an interview with one of the residents of Huehuecoyotl, one of the best known and longest running ecovillage in Mexico:

> Many people who come to the eco-village design course [run by Huehuecoyotl] want to find the ideal place in some gorgeous place that has mountains and rivers and access to clean water and its way the hell out in some rural area that is so hard to get to they won't get many visitors, an influx from the outside world. What some of us have found is that (being) only an hour away from the airport in Mexico City, it has afforded us the flow of people from all over the world. Many times, an ecovillage is projected to be in these ideal settings, but they're so far away that after a few years people get a little stymied and are desperate for some fresh air–culturally–so there is something to be said for choosing an area that's not so far away that people can't visit

[65] Interview with Mariana, June 14, 2019.
[66] Interviews with Ecovillage Residents, May 23–25, 2019.
[67] Interview with Ecovillage Founders, Jalisco, October 14, 2014.

you.[68]

Location is especially important for communities that heavily rely on volunteer or apprentice labor, as volunteers seem to be more inclined to visit ecovillages close to popular tourist routes. Rancho Bosque was in the mountainous cloud forests of Veracruz, not far from the region's capital city, and attracted a handful of international volunteers at a time. Still, Rodolfo imagined that other communities were far more successful in attracting visitors: "we're not right by the coast, or a really famous city, even though we have much here–not so many foreigners (*extranjeros*) come out here."[69] Hence, geographic position of communities and proximity to touristic areas or large population centers were important aspects of attracting visitors and new members.

Maintaining outside employment and a steady income was important, Mariana had told me, because of the significant costs associated with "incorporating" as an ecovillage. The parcel of land they had located outside of Guadalajara, while still relatively affordable, was not as cheap as what Mariana called "*terrenos perdidos*" (literally, "lost lands")–land far out in the countryside, where little infrastructure existed. There were also significant legal costs in transforming the land into a place where an ecovillage might be able to exist. Mariana explained that the group had hired an agrarian lawyer to help them navigate the complex zoning laws pertaining to *ejido* land, most of which is classified for agricultural use only. To have sufficient space to construct greenhouses, spaces for animals, and residential homes, it would be necessary to change to a different category of zonation (*uso de suelo*, or "use of soil"). Mariana expressed frustration that the laws appeared to be designed with developers in mind, and that applying for the land to be zoned as residential space (*habitacional*) would only be economically viable with greater population density. "And

[68] Interview, March 11, 2019.
[69] Field Notes, January 15, 2019.

obviously, an ecological project can't have a high density of people, either! Because that wouldn't be ecological. So, there are like two conflicts. On the one hand, yes, we're an ecological project–we don't want, although the law permits it, to have a high density. But on the other hand, we have to pay for the land, and so it's like 'agh!'" She smiled wryly, and threw up her hands in mock frustration. This conversation revealed how visions of a sustainable community was challenged in place by the practical difficulties of transferring land ownership, a lasting effect of the country's dismantling of communal forms of land tenure (as discussed in chapter 1).

Foreign founders of ecovillage communities are often unaware of these difficulties at the outset, and acquiring land on which to build an ecovillage project is a hurdle that many prospective projects never clear. In a Facebook group for potential ecovillage residents, one would-be community founder in Yucatán who had posted regular updates on progress on the site–including the construction of a pool, planting fruit trees, and installing solar panels–suddenly went quiet. After some time, they posted a final update:

> "Hello everyone, and sorry for the late responses. I ran into some financial problems with the village and couldn't complete [it], as well as had issues finding the legal documents for the land. So, I've been working on establishing a new property. Anyway, I have much more funds to invest this time around and really planning this next village out to follow sacred geometry design and of course, build a permaculture food forest"[70]

In a Facebook group dedicated to finding and founding ecovillages in Mexico, many of the public posts are dedicated to finding land for sale in order to construct projects with a sustainability focus. "I have a plan to buy a plot and construct a completely sustainable project (that also generates an income), and I would like it if it were a community," reads one post. "If anyone has suggestions of lots in [existing] ecovillages or land, *adelante* [go ahead]!"[71] The theme of many of these posts reflect strong interest and motivation in starting

[70] Research Notes, June 15, 2020 [from public Facebook post from May 2018, now deleted].
[71] Appendix G, Item 5.

a variety of projects articulated as "eco-friendly": an "agroecology project" with bees, a "self-sustainable" (auto-sustentable) hotel with natural pools and large gardens, or a place to give courses in alternative medicine, permaculture, and building with natural materials (*bioconstrucción*). While several group members have documented their success in acquiring rural land, some have reflected on the magnitude of the task at hand. "I have a small plot, and I want to make it sustainable and form a small community. [But] I don't know how to begin, the land is undeveloped [*sin trabajar*] and I don't have a budget...I would appreciate any comment or idea... in order to get going!"[72] Despite the apparent interest in ecovillages on social media, the number of aspirational posts seem to greatly outnumber the number of new communities actually under construction. This mismatch reflects the practical obstacles that confront prospective ecovillage residents in founding new communities, as I discuss below.

4.1.4 Gathering Funds

Financial resources are an important part of starting and keeping up an ecovillage project. "Money is a big issue for us…I wish it weren't like that, but it's just how it is, especially while we're building," acknowledged one ecovillage resident.[73] Particularly in the beginning stages of projects, money is necessary to procure everything from land parcels, equipment or building materials, transportation or heating fuel, animals, plants, seeds, and so forth. Even if ecovillage communities are envisioned with the goal of food sovereignty in mind, harvesting a yield (either from livestock or garden spaces) is not possible for at least one growing season (if not several years). In one of my first visits to a community, one resident explained that "one of the main challenges we've had especially because we're working in a developing country, or the economy in Mexico is not so easy... it's the economic side. So, we've tried to figure out what kind of productive projects we can have to keep this

[72] Appendix G, Item 6.
[73] Interview June 29, 2018

thing running. And I think we've had to really focus on that".[74] Other enterprises, such as cultivating bees and selling honey or holding paid workshops, became important points of focus in daily community life, such as in Aldea Ceiba or Tierra Madre.

Prospective ecovillage communities rely on support from individual donors and volunteers, both from within their own social networks and beyond. In the first three years of their operation, Aldea Ceiba hosted over 100 volunteers from Mexico, as well as countries all over the world. Volunteers support projects not only with their labor, but with a monetary contribution of approximately 200 MXN (8,25 EUR) per day to cover additional costs (primarily food and transportation). Later, this pricing model was adapted to charge lower rates for visitors and volunteers from other Latin American countries. The information sheet and participant agreement form that was distributed to prospective volunteers described this difference as a means of building solidarity and making their project available to the greatest number of participants. At Rancho Bosque, volunteers received free accommodation and simple meals in exchange for working scheduled shifts in various areas of the community. Tasks vary greatly, and range from working in communal kitchens and gardens, to harvesting or preparing specialty products (e.g., honey, coffee, or dairy products) or working with livestock animals. Among volunteers, a common sentiment was that the additional financial contribution on top of their volunteer labor was an acceptable exchange, owing to the practical experiences gained.

In addition to receiving financial support through foreign visitors and donors, ecovillage residents in each of the communities visited in this study also enjoy modest financial support from foreign institutions. Rancho Bosque, for example, received significant funds from the U.S. Agency for International Development (USAID) in the 1990s in order to convert the property from a conventional farm that used agrochemicals into a

[74] Interview, June 15, 2018.

"silvopastoral"[75] reforestation project. More recently, Rancho Bosque received institutional support from the Germany-based GLS Trust, which provides funds for social and environmental projects predominantly in Latin America, Asia, and Africa. In particular, the program provides support for the development of organic agriculture enterprises and associated training and education programs. Similarly, Aldea Ceiba community carries out a portion of their activities…specifically, community agroecological development projects and environmental education programming…through the support of a patchwork of foreign nonprofit and state development institutions (largely through the administration of micro-grants) in the United States and Europe.

Ecovillage communities in Mexico also benefit from funds made available by the Mexican Government for civil society projects that address climate change and economic development. The nationwide program *Jovenes Construyendo El Futuro* (Youth Building the Future) was instituted in 2019 as a joint initiative by the Mexican Secretary of Labor and Social Security (STyPS) and the Secretary of Public Education (SEP), and provides stipends for young adults for educational and work development opportunities. Because Rancho Bosque, Tierra Madre, and Aldea Ceiba are incorporated as civil associations in Mexico (Asociación Civil, or A.C.),[76] each was able to serve as hosts for young apprentices, who in exchange receive 3600 MXN (approximately 150 EUR) per month for a period of one year, in addition to receiving health care.[77] Some young residents of ecovillage communities received training funds through the *Sembrando Vida* ("sowing life") program, an initiative of the Secretary of Welfare. The program aims to simultaneously address rural poverty as well

[75] This refers to a system of integrated agriculture that combines pastured animals together with agroforestry practices.
[76] either in and of themselves, or through an arm of their community's work
[77] It is important to note that this is a somewhat indirect mode of financial support largely because these funds go directly to the young person enrolled as an "apprentice," rather than the project itself; however, communities still benefit from the labor of individuals enrolled in the program.

as environmental degradation[78] by providing financial support for training and materials (e.g., plants, tools) for realizing an agroforestry project.

In order to make use of these sources of funding, ecovillage communities must make themselves into particular kinds of organizations that are deemed eligible to receive these forms of support. Ecovillage communities as such are not necessarily eligible to incorporate as an A.C.; however, a consortium of community members might formally organize as an A.C in order to format a portion of their activities–voluntary work in local communities or environmental or agricultural education projects, for example–under the aegis of a separate A.C. entity. As discussed above, this legal identity allows communities to become legible to state funding programs and external donor programs, and thereby eligible for financial support. Similarly, ecovillage communities that rely on volunteer labor and monetary contributions must make themselves into places that are attractive and accessible to volunteers. To do this, ecovillage communities may create and manage social media channels on behalf of the community, promote temporary rentals through platforms like Airbnb, or arrange educational programs or workshops for visiting volunteers.

These expectations can cause a substantial diversion of resources or energy on the part of the community. On a follow-up visit to a community, I had asked one resident what projects they were focusing on at the moment. “For us, the thing we have our attention to right now is the volunteers–for sure,” they emphasized. “It tires you out sometimes, because you always have to focus on their needs, on top of all the things we are doing.”[79] Tending to the needs of volunteers could also result in a strain on material resources. Because the community was located somewhat far away from the nearest town, regular transportation to and from the community was required to pick up new volunteers or visitors, as well as

[78] Sembrando Vida page
[79] Personal Communication, March 26, 2019.

acquire extra food or supplies necessary to accommodate greater residential populations. Acquiring larger quantities of filtered water, food, or medical supplies or other services might only be possible by traveling to the nearest regional city, which requires a significant investment and time and fuel. While many community residents chose to walk alongside the road that stretched from the forest location to their residence in town (when a drive would have halved the transportation time), vehicles were often necessary to deliver visitors who were unused to the terrain or when transporting heavy supplies and personal belongings.

While visitors were most usually welcomed into the community, their presence was also the subject of a careful cost-benefit negotiation between the need for volunteer labor and financial support, and the ability of the community's systems to support them. As Gonzalo explained on a community walkthrough for workshop participants: "We love having volunteers, but sometimes it is too much. We are surrounded by water, but all of it here in Yucatán, it's underground." He continued down the path, pointing out a small grove of mangoes near the community's outdoor showers. "These mangoes are our guide. When we have too many people–thirty people or more, especially in the dry season–these trees will start to droop," he explained, noting that this was the point they began to curtail volunteer acceptances.[80] This instance reveals how more-than-human others factored into (and served as indicators for) the decision to admit volunteers or expand the community (Morris 2022).

Occasionally, communities pass up certain opportunities because the cost of participation (in terms of time, energy, or resources) was considered to be overly high. The community of Tierra Madre, for example, was established after their previous iteration as a civil association was dissolved; the newly established financial reporting guidelines of the Europe-based women's rights organization that had been funding them were deemed too

[80] Field Notes [recorded audio], March 28, 2019.

onerous.[81] Similarly, Rancho Bosque had declined to participate in a local initiative to compensate farmers for the "ecological services" provided by forested areas of their lands. Although Rancho Bosque described the conservation of forests to be a key aim of their project, community leaders described the process as too time-consuming. Even Jens, ever-organized in his documentation of the farm and daily journaling practice, seemed doubtful: "we have so much going on here already, and it's a whole process," he told me.

Ecovillage residents shape their communities into places that can generate (at least a modest) income to support their activities. However, these practices of place-making were not only influenced by the motivations and visions of the residents, but also by the expectations of external actors. Making community projects into fundable enterprises must involve, to some extent, adopting the language or acknowledging the aims of specific funding bodies–namely, an emphasis on "productivity" of rural lands. The aim of the *Sembrando Vida* program, for example, is to "convert ejidos and communities into a strategic sector for the development of the Mexican countryside–working together in order to increase the productivity of rural zones from a focus of sustainability and regional development".[82] While "productivity" is not explicitly defined in the initiative's documentation, the development of agroforestry systems are framed as a strategy for improving "efficiency" in rural development by accomplishing dual goals (reducing social vulnerability and food insufficiency"[83]) while also improving the environment, regenerating soil fertility (*recuperación de suelos*).[84] Similarly, Rancho Bosque's funding through USAID was part of an initiative to reduce greenhouse gas emissions by training campesinos in agricultural

[81] When pressed, the interviewee declined to explain in further detail, but suggested it involved an increase in documentation requirements and administrative tasks related to grant administration.
[82] "*Programa Sembrando Vida*" [Sowing Life Program], Gobierno de México [Mexican Government, last modified November 6, 2020. https://www.gob.mx/bienestar/acciones-y-programas/programa-sembrando-vida
[83] Translated from original Spanish: "combatir la insuficiencia alimentaria del país."
[84] "*Programa Sembrando Vida*" [Sowing Life Program], Gobierno de México [Mexican Government, last modified November 6, 2020. https://www.gob.mx/bienestar/acciones-y-programas/programa-sembrando-vida

methods that "protect and renew the environment."[85] The justification and objectives of Rancho Bosque's successful application heavily emphasized gains in productivity, arguing that with the implementation of regenerative agricultural methods, the "land becomes more productive–supporting more livestock than before" while at the same time "allowing all [tracts] to rejuvenate and reforest."[86]

Because these broader funding organizations articulate the causes of social and environmental issues differently, receiving funding from these organizations can promote or foreclose particular practices at the community level. For example, the organization through which Rancho Bosque receives part of their funding is part of a larger financial institution in Germany, GLS Treuhand, founded on anthroposophical principles. The fund sponsors organic agriculture projects among other initiatives, and places a particular emphasis on fostering "self-sufficiency" in local communities by "helping people help themselves."[87] Rancho Bosque's gradual adoption of biodynamic agriculture principles in their farming practices, along with their emphasis on educational programs for young farmers, has helped fit the community into the broader institutional aims. External institutions may also disincentivize the use of certain practices. *Sembrando Vida*, for example, declines funding to owners of parcels that practice "burning" of parcels.[88] While this deliberate phrasing might be linked to reports that *campesinos* have purposefully burned existing forests in order to qualify for the program (de Haldevang 2021), it is also worth pointing out that swidden agriculture was, and is, regularly practiced by the indigenous Maya populations in the Yucatan peninsula, where Aldea Ceiba is located and conducts work. As a discrete, contested practice, burning parcels before planting requires ecovillage residents to make choices

[85] USAID Grant Agreement Documentation, Award Number 59806161088900.
[86] *Ibid*.
[87] "Zahlen und Zuwendungen" [Payments and Allowances], GLS Treuhand. 2017.
[88] "*Programa Sembrando Vida*" [Sowing Life Program], Gobierno de México [Mexican Government, last modified November 6, 2020. https://www.gob.mx/bienestar/acciones-y-programas/programa-sembrando-vida

between dissonant practices. Navigating this decision-making process is complicated by the dissonant relationships that ecovillage residents cultivate, both with local communities and with the state.

4.1.5 Gathering Other Beings

The entrance to the Rancho Bosque community is marked by a large vinyl sign, strung up high in the tree branches that bowed over the small road. The sign reads:

> FOR OUR APPRENTICES–You all can and should be proud, because you practice the most important profession that exists. TO WORK THE LAND; RAISE ANIMALS; TAKE CARE OF THE ENVIRONMENT, THE FOREST, THE SOIL, THE WATER. Without you, without agriCULTURE, there would be no known development, CULTURE, would not have developed, and without this no civilization. BE PROUD OF YOURSELVES!
>
> Sign at the Entrance of Rancho Bosque, Veracruz

The message was one which Jens, one of the founders of the Rancho Bosque community and the creator of the sign, firmly believed in. "Too many young people leave rural areas, they think that an education is going to give them a stable life. Then they start thinking that agriculture is 'backwards,' they have no pride in the *campesino* life, the lives of their parents," Jens told me gruffly. Despite the invocation of apprentices, the sign was not only for them, Jens explained; it also sent a message to the neighbors and city dwellers nearby, who visited the farm stand occasionally to purchase meat or fresh cheeses. The sign conveyed his frustration with the sense that society had it backwards–that agricultural work should be respected, even exalted, and that a broader shift in perception would come about if only local youths reconnected with the land through work. Even more, the linkages drawn between "agriculture" and "civilization" reflected what Jens understood to be the central work of Rancho Bosque: namely, inspiring discipline and rigor in the ways locals managed agricultural landscapes. The sign, and later Jens' mealtime lectures, reflected the broader narrative of the importance of work (rendered as "labor") in managing sustainable landscapes.

Although the sign had been one of the first things I noticed on my initial visit to Rancho Bosque, it had gained a new significance by the time I left. For Jens, the idea that animal agriculture could be an environmentalist practice was the cornerstone of Rancho Bosque's vision; namely, that rotative grazing practices could both provide for young farmers and their families while also rebuilding soils and conserving forests. Demonstrating the viability of this aim was one of the key goals of Rancho Bosque: to "find forms of increasing the production of food without damaging the environment...[by] working harder and harder to achieve our goals".[89] But caring for other beings (animals) were not only seen as important as a means to an end, but also to the community's identity. Caring for animals represented "honest work," that required commitment to the land; waking at dawn to feed animals or move them to their pastures before feeding oneself was seen as a noble pursuit, and incompatible with the decadent lifestyle that young men were increasingly seeking, explained Jens. While Rancho Bosque integrated other components into their agricultural plan, such as terraces for kitchen gardens, or orchards of macadamia and coffee, the animals they cared for were undeniably at the center of both the community's daily practice and overarching narrative.

Assembling other beings into systems–economic or agroecosystemic, for example–is a fundamental practice of ecovillage design. Ecovillage communities make use of or deploy different kinds of species for a variety of purposes: growing food for themselves (or the other beings they care for), producing energy, building up biomass in soils, or treating maladies. Different communities prioritize the values attached to each of these species in different ways, both for what they represent and what they provide. At Aldea Ceiba, for example, cultivating hives of several native bee species was a practice that satisfied multiple objectives–producing honey and wax to sell and consume, but also because of their

[89] Personal Communication. April 5, 2019.

importance as specialist pollinators of native trees. While Rancho Bosque also cultivated bees and placed a focus on reforestation on the margins of their land, residents claimed animal agriculture as a key driver of rebuilding soil fertility. While both practices may be oriented more or less towards the same broad goal–building regenerative, self-sustaining systems through the strategic use of particular species–each community prioritizes different kinds of beings in accomplishing it.

The location of an ecovillage alternatively permits and forecloses the care of particular species. On a practical level, ecological and geographical constraints make it difficult, costly, or impossible to cultivate certain species that are adapted to different areas. While tropical fruits such as papayas and pineapples grow in abundance in the tropical climate of Aldea Ceiba, papayas cultivated in more centrally located Tierra Madre wilted and required constant manual watering. The kinds of species that are appropriate are sometimes suggested by features of the landscape itself, influenced by decades of previous use. For example, Rancho Bosque had been founded on a parcel of land which had already been heavily deforested on lower slopes, and was characterized by degraded pasture lands. Therefore, caring for livestock was understood as a kind of compromise between the land's current state (overgrown pastures), and what they wanted it to look like (substantially reforested). Similarly, a previous owner had planted a modest orchard of avocado trees on the land that had become EcoMonte. In comparison with the intensive work of cultivating raised beds and kitchen gardens, which required hands-on, daily observation, the maintenance of the orchard required relatively less attention apart from occasionally watering the area. As the locus of community life became gradually centered on a lower slope of the mountain, the orchard became one of the few intentionally cultivated spaces in the whole community.

Determining what kinds of plants or animals to cultivate was not always a matter of what was available locally, but rather was influenced by matters of personal taste and

aesthetics. Ecovillagers planted the kinds of crops they wanted to eat, work with, or look at, an assessment that was informed by but did not always cleave to what species were "native" to the area. As discussed in chapter 5, personal taste was a key factor that determined Tierra Madre's selection of species for cultivation, somewhat independent of seasonality or local availability, while at Rancho Bosque, raising livestock aligned with residents' preference for consuming meat. Occasionally, these personal tastes adapted to what was more readily available in the community's landscape–for instance, the cooks at Aldea Ceiba made a concerted effort to integrate the seeds of native trees such as *ramón (Brosimum alicastrum*) or *guanacaste* (*Enterolobium cyclocarpum*) into the foods they prepared for communal meals. Other times, personal taste remained orthogonal to the availability of native species. At Rancho Bosque, for example, one volunteer's attempt to add clover and other edible "weeds" to salads prepared for evening meals was widely panned by other residents because they found them unpalatable.

Occasionally, the cultivation of non-native species was preferred over local alternatives. For example, Aldea Ceiba residents indirectly cultivated Mombasa grass (*Panicum maximum*), a grass native to Africa that had been introduced. The non-native grass was considered easier to work with because it did not propagate "in a destructive way, like native grasses" (that is, by seed). For this reason, residents preferred the dried grass as a material for tasks like thatching roofs or building composts, because it provided the benefits of some native grasses while being substantially easier to control. As I discuss in chapter 7, the livestock that some communities cared for were not native to Mexico at all, but had become a traditional practice in the intervening centuries since Spanish colonization. Each of these scenarios reveals the way that individual tastes and preferences present in each community generates fluid processes of negotiation and valorization of particular species, depending on the ways that they fit into ecovillagers' broader plans.

Understandings of values of other species–which were good to eat with, work with, or live with–were cumulatively developed over time, as residents developed greater levels of experience in the environments surrounding their community. For example, multiple residents at Aldea Ceiba related that their first attempts at building raised garden beds on the land was a difficult one because what the crops that were chosen to grow had been unduly influenced by personal taste–carrots, potatoes, and other root crops that they had grown with success in their communal garden in Mexico City had failed to thrive in the Yucatán forest. Ecovillage residents also gravitated towards caring for the kinds of species they knew how to cultivate, or had had experience with before. At Aldea Ceiba, the head beekeeper Gonzalo related that he had known he wanted beekeeping to be a focus before the community was even founded, inspired by the work of his grandfather, a beekeeper. While many of Rancho Bosque's residents had come to the community specifically to learn about and practice caring for livestock as part of an integrated farm system, Tierra Madre not only lacked the physical space but also a general interest in caring for larger livestock: "the chickens are enough for me, and sometimes I can barely even manage that," said one resident.

Considerations for what kinds of species grow best in a particular location influence the strategies that ecovillage residents adopt for economic development. Rancho Bosque, for example, was located in an area of Veracruz renowned for its suitability for growing coffee. Most of Rancho Bosque's neighbors or other farms nearby earned a considerable portion of their income through the cultivation and sale of whole coffee beans. While Rancho Bosque maintained a shade-grown plot of Arabica coffee, harvesting coffee was a process that often took a back seat to the daily demands of work with livestock. Instead, sporadic harvesting throughout the growing season (whenever there was time and a sufficient number of helping hands) meant that there was often only enough coffee for consumption within the community and for occasional sale to a local organic market. During my time in the community,

however, several permanent residents had taken note of the example set by a local biodynamic farm that was a sometime-collaborator of Rancho Bosque–to wit, they had recently earned a Demeter certification, and begun selling their beans to a German roasting company. As a result, the priorities of the community turned gradually towards developing a focus on coffee–compost and young coffee plants filled up once-fallow terraces, and Rodolfo developed an evening lecture on the process of harvesting and roasting coffee, complete with a guided tasting.

Growing "cash crops" or economically valuable species can provide a source of stable income that allows further investment in the community. At Eco-Rancho in the state of Jalisco, owner Ricardo led me into a large greenhouse, funded in part with a small grant to fund organic agricultural operations. Inside were rows of tall, lush turmeric and ginger plants, key ingredients in their branded line of tonics and flavored brews. The business helped allow Jaime to purchase a parcel of land across the road on which to start the "sustainable cohousing community" that eventually became Eco-Rancho. "Just like we're taking care of plants, he says, they're taking care of us," Ricardo told me. Similarly, as the gardens were being planned in Tierra Madre, there was a strong focus on planting herbs and plants with medicinal value: "for later, when we start holding healing workshops," explained a resident. In some instances, caring for one economically valuable species enabled the care of other species that the community valued; this was the case in the cultivation of both native and non-native bees in Aldea Ceiba, which I discuss in greater detail in chapter 7.

Ability to care for a diverse array of different beings was highly contingent on the makeup of the community's residents–who they were, how many there were, and what they knew. Caring for particular areas of cultivation–from working with livestock to planning and maintaining gardens–was highly labor-intensive work that required a high degree of practical experience, and in some cases, experience with the individual quirks of the community.

When Rancho Bosque's resident population was decimated overnight because of an interpersonal dispute,[90] remaining community members diverted most of their attention to caring for livestock; as a result, the beehives, portions of the garden, and plans for future construction were delayed or severely curtailed. Communities with high levels of turnover in residents noted that this could negatively affect their ability to function. As a resident of Huehuecoyotl noted, having a high number of volunteers was not always beneficial: "We don't have enough people to be able to host WWOOFers for the community. Because that requires your time to show them what you want them to do, show them where the tools are, what you gotta do to get the tools, what we expect of you and so on and so forth."[91] As such, plans to expand cultivation at Rancho Bosque–for example, plans to add a rabbit hutch, or perhaps a pond for tilapia–always hemmed closely to the population of the community at the time. There was a general understanding that any fluctuations or unforeseen departures could leave gaps in the community's caregiving responsibilities, or at least increase the burden of labor on residents that lived in the community permanently.

At other times, caring for a broader array of species or kinds of cultivation areas was less of an issue, particularly if the community had the financial resources to hire laborers to perform care work or other tasks for them. At a community in Jalisco primarily occupied by retired adults from foreign countries, the community's founder explained that Mexico was an ideal location for developing a "self-sustaining" community because of the affordability of hired help. As he explained, "Here in Mexico we have a special economy that offers a low cost of living. We can afford to hire people to come in and help us out, to have a staff," he says, gesturing to some workers who are constructing a house near the edge of the property. "If we tried to do a community like this in Denmark or the United States, it would be much

[90] According to personal conversations with remaining residents, this departure was due in part to onerous working conditions and personal disagreements with community leaders. More on community "dispersal" is discussed later in this chapter.
[91] Interview with J., March 4, 2019.

more difficult."[92]

However, "gathering species" together was also a fraught process that did not always go according to plan. As discussed in later chapters, this was sometimes due to the "failure" of cultivated species to live, grow, propagate, consume, or die as expected. At other times, the representative value of other species did not resonate with others in a way that ecovillage residents had previously anticipated. At one ecovillage community near the coast of Jalisco, my conversations with one of the founders revealed that elements of their development strategy had not turned out the way that they had initially planned. One of the initial ideas about the project, one resident told me, was to sell the products of their livestock operations to earn some supplementary income: eggs from their chickens and ducks, for example, or selling cheeses, yogurt, or meat from their project raising goats. Although they had made a few relevant connections to a market for organic foods in the nearby tourist hub of Puerto Vallarta that had agreed to sell their products, the journey from their community to the shop–hours by public transportation, if one could even make it down the unpaved roads to the highway–was cost-prohibitive. A greater disappointment, offered the resident, was the ways that their plans to involve the local community in their goat-raising operation had not proceeded as expected. As she described:

> When we first came here, I had this vision in my mind, I was going to create this kind of, like, nonprofit [goat] dairy but employ local women, and could give women a way to make money on their own, give them an outlet so they didn't feel like the first thing they needed to do was find a boyfriend and get pregnant. Um, I had all these ridiculous, like, fantasies about that in my mind…like, the self-promotion of birth control and all this other stuff. [But] coming and milking a goat is as far away from anything these village girls want…it's like, they're watching *telenovelas* [soap operas], they're watching all the women with the fancy jewelry, and the fancy shoes and the handbags, they all want to go to [Puerto] Vallarta and get…you know, [they think] they're instantly going to get a job and be rich and have fancy clothes! They do not want to come and milk a goat...and coming here? I couldn't have been more

[92] Interview with A., May 23, 2019.

wrong... Maybe, maybe if they shot a television show down here![93]

For this woman, goats were a link to development–goats represented a source of milk, cheese, and of course, meat–which could be sold for a small income. What this landowner identified as a distaste for farm work and a desire for luxury on the part of the local women, however, could just as easily be explained by the fact that the market for organic, locally produced dairy products in the small coastal community was almost non-existent. This conversation also reflected a disconnect between how this resident understood sustainability for herself and for the women who lived in town: while her version of sustainability involved moving to a rural area of Mexico and "living simply" on the resources she had accrued elsewhere, her understanding of sustainability for local women involved staying in the communities they were raised in, and "living simply" through cottage enterprises.

This mismatch between the resident's expectations (both for the local women, and for the sheep) illustrates some of the ways that "gathering" is not a straightforward process of "collecting" like elements that "work together." In this example, the women that this resident imagined to be potential collaborators and project beneficiaries did not share her vision for what would be a "good life." Likewise, the land they had been able to acquire from a private seller raised other complications (logistics, for one) that complicated the visions this resident had for raising livestock and crops and perhaps earning a small income. These competing priorities and considerations–which spilled across categories of land, resources, other beings (both human and not)–intersected and overlapped in particular ways that make putting a plan for a "sustainable community" into action much more difficult, if not impossible.

4.2 Conclusion

Interviews carried out with ecovillage founders, residents, or visitors in Mexico

[93]Interview with H., October 18, 2014.

revealed a diverse range of approaches to community design, reflected by different practices of "gathering" together people, funds, land, knowledge, and indeed other species. Each of these residents brought with them different understandings of what sustainable livelihoods meant and looked like, informed by their own lived experience and backgrounds, which in turn influenced the ways that ecovillagers curate and construct socioecological systems.

Tracing the processes by which different entities are gathered reveals the ways that these categories are intertwined with one another. "Knowledge," as understood here, does not exist independently of the people that possess and utilize it; similarly, "land" is not an empty vessel filled up with a motley assortment of more-than-human others. To speak of "gathering" in relation to one of the categories established above necessarily requires thinking with each of the others. The goal in flattening these gathering processes is not to suggest that land, people, or other beings are simply "ingredients" that, when added together, produce ecovillage spaces. Instead, the analysis of each gathering thread above reveals the complex ways that land, people, resources, or other beings (among others) that overlap, diverge and in some cases counteract one another in particular ways.

The separate treatment of these gathering threads also reveals the importance of social and ecological context in bringing together distinct constellations of actors and entities. The same factors that allow certain kinds of (prospective) residents to acquire land in rural areas in Mexico are tied up in the continued production of socioeconomic disparity. These inequalities are textured and relational: it is not only sustainability-minded foreigners that claim rural spaces as venues for ecovillage communities, but also Mexicans that come from families with means, often from urban environments. Similarly, what kinds of knowledge become valued (or not valued) in place is not based simply on an objective assessment of "what works" in place and "what does not." Instead, particular kinds of knowledge are legitimated (and further, repeated and disseminated) based on individual experiences of

place, including understandings about how different knowledge maps onto more-than-human bodies. In the next chapter, I explore the community of Tierra Madre through these lenses, teasing out in more detail some of the contradictions, overlaps, and gaps elicited here. In doing so, I work towards an understanding of "gathering" as a multi-layered, networked, and inherently situated process, asking what this means more broadly for enacting sustainable futures.

Chapter 5. Gathering through Exclusion: Garden Spaces in Tierra Madre

"We are making communities by design, not by accident."[94]

Ecovillage founder and resident, June 2019

The entryway to Tierra Madre is marked by a solid metal door: bright red, twice my height, and topped with barbed wire. To get here means leaving the center of the small town nearby, and passing by multi-story cinder block dwellings towards the fields that surround the town. Rows of squash and cucumbers peek up from holes carefully spaced in long rows of plastic sheeting, blanketing the fields. There are few ways in, save for the tunnels dug by dogs (both feral and tame): only the volcano Popocatépetl and the tops of its foothills are visible above the fences encircling the community. Occasionally, the light dusting of volcanic ash, on windowsills and garden beds, gestures to other more invisible methods of infiltrating the barriers the community has erected around themselves. To the small group of women in the process of founding an ecological community, this was an ideal setup. They didn't need others to know who they were, or what they were doing there–in fact, they preferred it that way.

Tierra Madre is a lesbian feminist separatist community that also identifies as an ecovillage, and which had upon my first visit recently celebrated one year since breaking ground. Like other ecovillage communities, Tierra Madre sought to cultivate their own systems of subsistence and mutual care that were shaped by an attentiveness to the natural world. Tierra Madre was decidedly different from other communities that I had encountered

[94] Interview, May 23, 2019.

elsewhere in Mexico, however, in terms of their key goal: to create a world for women that existed independently–in both a symbolic and material sense–from a society they understood as irredeemably patriarchal.[95] As this chapter discusses, putting this vision of a "feminist utopia" into practice required engaging with new skills, forms of knowledge, and arranging more-than-human actors in ways that aligned with the ideological foundations of the project. The ability of Tierra Madre to achieve their goals was contingent not only on the participation of particular more-than-human lives, but also on the manner in which they participated. Bees, dogs, chickens and chiles were "enlisted" (Latour 1999; Kien 2009) or "enrolled" (Callon and Law 1982) in the project of Tierra Madre for various purposes.

In this chapter, I explore how Tierra Madre residents selectively gathered together different forms of knowledge, people, and other species, and ask what these assemblages reflect about their understandings of sustainable community. Following from an understanding of ecovillage communities as more-than-human assemblages (discussed in the introduction), the concept of "gathering" reveals the ways that such assemblages begin to take form in place (Li 2007; Anderson and MacFarlane 2011). By practices of gathering, I draw on discussions of place-making as a "bundling together" of practice and values (Li 2007; Pitt 2018), and call attention to a host of elements that are mobilized and drawn together in the production of sustainable communities: more-than-human others, forms of knowledge (and ways of legitimizing knowledge), materials, resources, and land. Here, I deepen this theoretical understanding of gathering by also exploring them as practices of exclusion: of "taking what is needed," while rejecting or leaving behind what is not (Meijering et al. 2007; Roestone Collective 2014). Exploring how human residents draw boundaries around themselves and particular more-than-human others in the production of

[95] I use quotation marks to indicate what I discuss in greater detail below: Tierra Madre residents used this term in the narrowest possible sense, a position that I don't share. Below, I discuss their definition, as well as the methodological and practical difficulties this presented for carrying out research in this community.

sustainable communities, I suggest, reveal important elements in underlying sustainability narratives: namely, distinctions about what should and should not be "sustained," and why.

Gathering and assembling different entities into functioning systems is not only an additive process, involving the combination or recombination of different elements into a cohesive whole; it can also be subtractive, reflected in the ways that other beings or entities are eschewed, weeded out, or denied in the process of building community. These concurrent politics of exclusion as well as inclusion are both at work in producing community boundaries, and are evidenced by instances where residents make key choices about who, and what, to include and care for in enacting sustainable imaginaries. Excluding certain beings (both human and nonhuman) also served as a way for Tierra Madre to distinguish themselves from not only the "mainstream," but other alternative social movements as well. Practices of social exclusion based on sexuality or gender identification[96] were not understood by the residents to reflect malicious discrimination, but was rather understood as a curatorial practice, where humans and more-than-human others were seen as equally subject to the aesthetic whims and epistemological leanings of the community's inhabitants.

While each of the communities discussed in this research might be said to engage in practices of inclusion and exclusion, the example of Tierra Madre provides an opportunity to explore the ethical implications (and, as I will discuss, impossibilities) of designing exclusive sustainable futures. The work of Tierra Madre reveals how ecovillage assemblages are shaped by the aesthetic and ethical choices of their residents as they determine who is and is not a part of their community, but also how these choices are deeply subjective (and at times, objectionable or widely contested). Further, this discussion reveals how Tierra Madre residents' attempts to selectively draw boundaries (both figuratively and literally) around and through their communities were challenged in practice by more-than-human others. Using

[96] Specifically, transphobia.

the structure developed in chapter 4, I trace out different strands of gathering practices, revealing the messiness of exclusion in designing more-than-human communities.

5.1 Gathering through Exclusion

"When women are born, they have the capacity to give life–whether they do or not–and therefore their existence is more circular, like a cycle. This is the logic feminism has to offer to the world, to patriarchy, capitali...hm, hold on a second!" As Carola stepped away to take a phone call, the conversation in the communal kitchen shifted to the task at hand. We were chopping up *setas* (mushrooms) gathered from a log outside of the greenhouse, ready to throw into a hot pan with onions purchased in the market that morning. Offhandedly, I asked another resident about the usage of the word "*seta*," and what difference it signified between other mushroom-related words–*hongos*, for example, or *champiñón*. "Well, I guess they are similar…but alright, for example, if I saw *hongos* on a menu, it's a whole family so it would be kind of odd. It's like seeing *carne* on the menu–I would be like, 'OK, well, what kind?'" answered Katrina.

When Carola returned from her call there was brief lull, and I prodded the conversation back to where we had left off. "So, now with your explanation, I think I understand more what you mean, this idea about 'feminist ecology'...," I offered. Carola quickly interjected: "In radical feminism, we don't use the term ecofeminism." Katrina, who had moved into a side room to begin washing utensils, poked her head back into the kitchen to concur. "No, no. It's just like the *hongos, setas, champiñónes* question. Saying something is a 'feminist ecology,' that's like saying feminism is just branch of ecology, like it's something separate. Radical feminism instead is like, questioning the whole system–women are at the base of *everything*. It's the *hongo* (the fungus), not the *seta* (mushroom)."[97]

[97] Field Notes [audio], Personal Conversation, August 20, 2019.

A politics of difference-making is central to the project of creating Tierra Madre as a place: both conceptually, as a site of ideological resistance and identity affirmation, but materially, in the ways that Tierra Madre design and occupy their community space. As the mushroom anecdote above suggests, it was important for residents to maintain the conceptual distinctions between diverse feminist epistemologies: drawing a clear line between "ours" and "theirs." In a decades old self-published essay entitled "Radical Autonomous Feminism: A Civilizing Proposal,"[98] Carola had argued for the need to identify and explore "different feminisms," writing that "from different stories, biographies, and experiences, individual and collective...from diverse understandings, internalizations, and profundities of feminist theory, critique, and practice, diverse political positions, imaginaries of change, historical valorizations, and senses of 'what to do' have all been created" (xx).

For Carola and other Tierra Madre residents, maintaining this "epistemological diversity" was necessary in order to ensure space for their own understandings of radical feminism, which they saw as one of many diverse branches of feminist epistemology that were being rapidly subsumed by the broader hegemonic forces of "first world feminism." For example, residents were quick to point out their distaste with the growing popularity of the concept of "gender" in academic and popular spheres, which some dismissed as an abstract distraction from the goals of feminism: "gender is almost like a synonym of feminism... but that erases the essence of what feminism was–the search for liberty,"[99] Carola argued in a YouTube interview broadcast from Tierra Madre. In this way, the community of Tierra Madre was framed as a form of resistance to the perceived erasure of the residents' ideological and epistemological groundings.

While Tierra Madre residents don't explicitly cite other intentional communities as a

[98] The essay was well-known by residents and visitors to the community who had followed Carola's journalistic work and involvement with radical feminist networks in Mexico City, and can be found in the archives of http://mamametal.com

[99] Recorded Interview, "*Tallercitas Feministas*." Public Facebook Page.

source of inspiration for their own, they recall other rural feminist separatist communities (or "lesbian lands") of the US in the 1970s and 1980s (Valentine 1997; Cuomo 1998; Sandilands 2001, 2002). As Valentine (1997) observed during her work in such communities, control of space (particularly rural space) was a key issue in this movement, where distance from mainstream society was a way of creating and maintaining both conceptual and material space for women to live. Despite seeming to have this shared goal in common, however, Valentine (1997) also notes key differences between various communities, suggesting "there does not...seem to have been one common vision of how to create lesbian feminist ways of living and lesbian feminist space" (119). Rather, attempts at building senses of collective identity could have the opposite effect, and "often exposed differences between women which were negotiated and contested differently" (Valentine 1997:113). Although separatist and utopian ideals also permeated the narratives of Tierra Madre residents and visitors, in practice, these ideas shifted in relation to the "particular places and activities that are the everyday life of the community," where ideals and expectations were constantly "rearticulated with a variety of other ideas and practices of nature" (Sandilands 2002:140).

Tierra Madre describes itself as a community "by and for women," and confines its membership and visitors accordingly.[100] In the draft of their charter document, the *Constitución* of Tierra Madre, the goal of the project is stated as "to create a space of liberty and thus to think and re-think about the infinite creative capacities existing in the free definition of being a Woman and acting in relation with other women, which we understand as a way and a modality [of being]."[101] For Tierra Madre residents, the work of feminism–specifically, radical feminism–required a complete societal and ontological transformation, a recentering of women as the key focus in any attempt to imagine and live more "ecological"

[100] This is contingent on a definition of "woman" advanced by the community, discussed further below.
[101] "Tierra Madre Constitución," Unpublished manuscript, accessed July 2019. Printed document.

lifestyles.[102] As two members distinctly pointed out to me on different occasions, the primary focus of the project was *not* centered around "being ecological": "yes, we are ecological, that is an important aspect, but it cannot be first. *First*, we must work on finding a new way of caring for *women*…and our care of the environment comes from *that*."[103]

Sustainable community imaginaries at Tierra Madre were intimately linked with narrations of bodily difference, which became a recurrent theme in the ways that Tierra Madre residents described their principles and goals to the broader public. For example, in a response to a query on their public Facebook page about the lack of inclusion for trans women, for example, one resident wrote:

> Tierra Madre is a project that seeks to construct a world by and for women beginning with our corporealities as women…with all that it signifies socially, psychically, and politically. Our bodies are the instrument with which we touch life, and for women our bodies constitute the backbone of meaning, and of the possibility of liberty and of the construction of other worlds. That is our greatness, and that implies very clear limits.[104]

Statements like these reflected a clear intolerance for bodies unlike their own being labeled "woman" (particularly, transgender women), a sentiment that was only partially obscured by rhetorical appeals to the value of epistemological diversity. In other words, excluding particular bodies was not only a side effect, but rather a central feature of the Tierra Madre world-building project: reinforcing a sense of communal identity between residents and like-minded visitors by making distinctions between their body and the bodies of others.

As Tierra Madre residents constructed and fortified the conceptual limitations of their community, this in turn had material consequences for how the community was composed. Radical feminist discourse was front and center in Tierra Madre daily life, manifesting in

[102] Interview with Carola, September 11, 2019.
[103] Field Notes, June 24, 2019.
[104] Research Notes, comments on public Facebook post, originally accessed September 2019. The post has since been deleted.

informal chats in the kitchen or garden or in the kinds of media that community members consumed. The most visible impact was the makeup of the community itself: who was eligible to be considered a visitor or community member.[105] Tierra Madre's rigid concept of who their community was intended for activated a bidirectional dynamic of exclusion. As Tierra Madre began publicizing community events or publicly searching for new members in feminist circles or Facebook groups, they also began receiving a greater amount of negative attention and criticism for their exclusion of transwomen in online comments or blog posts. This example demonstrates (as discussed in chapter 4) how community narratives become linked to the kinds of visitors and residents they attract (which in turn, influence community narratives).

Constructing Tierra Madre as a place also involved a politics of exclusion in the sense that residents defined their community by drawing boundaries between themselves and the rest of the world, even with other eco-communities. Some residents were aware of other similar projects nearby or in neighboring states, such as a nearby permaculture demonstration site or an ecological community well-known for offering courses on topics in alternative agriculture. However, residents were skeptical about placing themselves in the same categories as these other initiatives. While Carola consciously chose "*ecoaldea*" as a moniker for their community, she added that it was not as precise as she would have liked. Carola explained to me that in her opinion, other ecovillages in Mexico[106] often reproduced the same social problems that they were seeking to fix in Tierra Madre. In one conversation, she described an experience taking a course on permaculture in another community, noting that there seemed to be more men than women participating. She continued:

> If the goal is to create a new world, why can't permaculture workshops offer something like childcare to participants? I ask this and people respond, "we should

[105] This is discussed in greater detail below.
[106] This included two other communities visited during of my field research.

> take care of them together, don't you think? Aren't you supposed to be a feminist?" I reply, "of course I'm a feminist, but truly how are you supposed to focus on permaculture classes if you're taking care of a child–running around, getting into trouble, needing attention?" I mean, what kind of new world are we creating?
>
> In other ecovillages, you still see women in the kitchen cooking, men out in the fields working. You see young mothers in 'eco-houses', but they are actually mud huts, shanties (*chabolas*). That is not an ecovillage–more like a slum![107]

In contrast, Carola prided herself on the careful attention to constructing and decorating the strawbale homes and common spaces, complete with new tile floors and new mattresses, Wi-Fi, and modular composting toilets. This story crystallizes two key goals Carola had for Tierra Madre: centralizing women in the community's critique of the status quo, while also designing a space that was, in their view, pleasurable to inhabit. Carola and other residents distinguished their ecological community from others by framing Tierra Madre as a space for women to recuperate from the trauma of societal oppression, as well as to indulge their senses–of "good food, good vibes (*buenas vibras)*, good living *(buen vivir*)."[108] These examples reflect how the aesthetic composure of the community and the choices that guided its design were negotiated between two (sometimes competing) aims: to be "self-sustainable" (*autosustentable*), but also to live comfortably and well.

In one sense, the residents of Tierra Madre might seem to be engaging what Sandilands (2002) describes as a "queering" of ecological relations: producing a "counterhegemonic culture of nature," protesting both heteronormativity and environmental degradation at once. Tierra Madre differs markedly, however, from other ecological communities, even those with an explicitly feminist focus (Cuomo 1998): actively rejecting transwomen, mainstream ecofeminism, and sometimes even the label of "ecovillage" itself. Without wishing to validate the premises on which Tierra Madre residents and visitors based their exclusionary politics, it is worth considering how the ways in which communities build

[107] Interview with Carola, June 26, 2019.
[108] Personal Communication, July 28, 2019.

barriers–ignoring, separating, excluding, or eradicating particular others– and how this produces consequences for broader more-than-human assemblages. In the following sections, I examine some threads of gathering practices in the context of the Tierra Madre community, exploring how each are shaped by practices of exclusion.

Gathering People

The Tierra Madre community, still in its founding stages, comprised five permanent, financially vested members. However, not all resided in the community on a full-time basis; houses and infrastructural elements, like kitchen and workshop spaces, were still very much under construction. In addition to accepting rotating casts of volunteers for short term stays, Tierra Madre also occasionally rented rooms to visiting guests, and hired a small crew of workers from the nearby town to take on building projects.[109] In exchange for staying with the community, I worked 6-7 hours per day supporting a variety of projects, including garden and greenhouse maintenance, care for their fledgling beekeeping operation, and a home construction project.

Although Tierra Madre was only in its first year of construction, the idea for the project had emerged gradually from long-established social relationships and decades of organization in feminist communities of Mexico City. Carola, the originator of the idea for the community and the principal landowner, had initially been part of such an organization in the Roma neighborhood of Mexico City in the 1990s, and had gradually built a network of feminist activists and scholars. The civil association founded by Carola and her partners had a permanent location in the neighborhood, which served as a site for workshops and discussions for a community of lesbian feminists interested in issues of social and political autonomy. Along with the project's partners, Carola also was involved in the creation of a

[109] For the purposes of this research, I considered these groups to be "residents" to a certain extent; "what was possible" was not only shaped by full-time residents, but also by temporary visitors and workers. These individuals contributed not only technical knowledge, but also connections to social networks in the neighboring town.

fairly well-known feminist newsletter in the 1990s.[110] Over time, Carola began to gradually diverge ideologically from other founders and members of her writing circle. At the same time, paying the rent on a property in a rapidly gentrifying neighborhood in Mexico City became more untenable, especially as financial support from foreign nonprofits began to require increasingly detailed financial accounting and administrative labor. Following the dissolution of the organization and the sale of the property, the possibility for establishing Carola's vision of a residential space for ideologically aligned women began to take shape.[111]

The founding members had strong opinions about what constituted genuine expressions of womanhood, in ways that expressly conflicted with the broader feminist community they had encountered. To varying extents, members did not recognize as women those individuals who were born without female genitalia. While some residents and invited guests were discrete about this opinion, one woman proudly identified herself and her pet dog (which had, at one time, served as an avatar for her social media accounts espousing her views) as "TERFs" (trans-exclusionary radical feminists). Community residents understood this position to be squarely outside of mainstream feminist discourse, and were unapologetic in this regard. Residents did not view this stance as contradictory to their stated goal of "being a space for women," but rather as being logically consistent; one resident explained to me that "we *are* being inclusive–to all *women*." At the same time, residents grappled with the realization that these stances might not be received well by the feminist community at large, and struggled with how to present themselves in recruiting volunteers, workshop participants, or residents in the future. "We want to keep the community how we want it, but we also don't want people to dox us, to accuse us of discriminating," explained the resident in charge of

[110] Visitors to Tierra Madre, or those who engaged with their presence on social media, often knew of Carola previously through her association with the publication. Katrina had first encountered Carola (after which she received an invitation to become a permanent resident) at a public lecture marking the digitization of the newsletter as part of a feminist archival project hosted by the National Autonomous University of Mexico (UNAM).
[111] Interview with Carola, September 11, 2019.

social media outreach.[112] Ultimately, the decision was made to include this disclaimer on public Facebook advertisements calling for interested volunteers, listing "*ser feminista, no ser trans*" ("be a feminist, not be trans") as requirements for hopeful volunteers (Image 3).

Image 3. Advertisement on Tierra Madre's public Facebook page.

Imposing limits on community membership proved to be a logistical challenge at times, both in terms of seeking out new members for the project as well as hiring help. During my stay, one prospective member was reluctantly denied a space in the community (despite being the friend of another member) because she was in a heterosexual relationship. Because her continued involvement with the project could not be assured, as it was assumed

[112] "Doxxing" refers to the leaking of private information that identifies a social media user, often used as a tool for public shaming. Field Notes, July 1, 2019.

that eventually her male partner would want to live with her in the community. These and other subsequent discussions on membership effectively limited the potential demographic of prospective permanent residents to lesbian radical feminists that ideally, were in committed relationships and could work remotely (or were independently wealthy).

Additionally, the community's expectations of constructing their community through the involvement of only female-born women were often challenged in practice. For example, Tierra Madre residents had planned to hire only women from the local town for wage labor in carrying out the various construction projects underway in the community, including a workshop, a library, and small homes, reasoning that this would provide financial support to local women as well as present an opportunity to model the possibility of living independently without the support of men. In practice, however, it proved difficult to find women from the nearby village who had the availability or skill to work in the much-needed positions as an *albañil* (bricklayer). While two young women were hired at the start of my stay to help construct cob walls and dig garden beds, they both left the project for personal reasons and family obligations after several weeks. Instead, a small team of five to six men were hired to come to Tierra Madre every day to help with various projects, leaving in the evenings for their respective homes in the nearby village. Similarly, while Tierra Madre residents tried to support businesses operated by women (for example, with the purchase of their composting toilets), their rural location meant that supplies and other necessities could often only be procured from shops and businesses owned by local men. While residents like Katrina and her wife acknowledged the contradiction between their procurement practices and their community goals, they justified the decision by explaining that it was a momentary necessity given the circumstantial difficulties.[113] Both examples demonstrate how the practical implications of their initial visions required revisions

[113] Personal conversation, Katrina and Z., August 3, 2019.

The strong convictions of the community's residents created an environment that at times was difficult to navigate as a researcher. As a cisgender woman who readily identified myself as a feminist, my relationships with community members were for the most part cordial and affable. Some residents themselves were often friendly with the male members of the construction crew that arrived each morning from the village, sharing some idle moments over a cold beer when Carola was not around. However, fraternizing with men during mealtime breaks (which they took separately) or greeting them in the town square outside of working hours was largely viewed with suspicion. In some moments, my relative position of privilege as a white, English-speaking, straight woman became a point of contention. The issues women in the US, in Europe were not the same as those they experienced in Latin America, Carola once argued–if I really was a feminist, it was of a different kind.[114] In a moment of frustration, another resident made a point to note that my sexuality made it difficult to speak with me about certain issues: "after all, straight women have historically been oppressors of lesbian woman. You're part of the patriarchy, but you don't even know it."[115] My status as a temporary visitor was palpable in ways unlike other communities where I conducted research, given that both my sexuality and unequivocal acceptance of trans-women as women disqualified me immediately from any kind of long-term community membership.

Despite attempts to limit membership in the community to those that shared their views unequivocally, the amount of labor required to sustain work across Tierra Madre's ongoing projects required negotiating these boundaries. Tierra Madre's first call for volunteers elicited diverse responses on their understandings of feminism and their own visions for sustainable communities, perspectives that did not always align with the founders'

[114] Field Notes, Personal conversation, July 3, 2019.
[115] Field Notes, August 27, 2019.

stated aims. Many volunteers wrote of their motivation to live in a community and share knowledge with other women, while some expressed an interest in learning more about "self-sustainability from feminist perspectives," specifically eco-feminism (a perspective that many residents expressed skepticism about).

Other volunteers expressed a desire for the opportunity to "return to" a simpler way of life: that "I am interested in visiting the eco-village because I believe that what is happening in the world requires us to start living in a healthier and more respectful way with mother earth and all living beings, rescuing the old ways of life," wrote one responded. Another prospective volunteer reflected, "I grew up in the country, so since I was little, I took a liking to manual activities and work in close proximity to the land. Unfortunately, moving to the city I have disconnected from that part that I enjoy so much, and I think being in Tierra Madre is a great opportunity to return to it... I would even like to create my own self-sustainable farm which would be a space for myself and other women in harmony with the earth."[116] Applications from prospective volunteers echoing similar motivations poured in from states across Mexico–Morelos, Jalisco, Oaxaca, Guerrero, or Baja California Norte–reflecting the singular position that Tierra Madre held as an ecologically-oriented community for women, even if only a particular kind. The outpouring of volunteer applications, despite the evident differences between how volunteers and Tierra Madre residents respectively imagined the community, shows further the potency of organizing concepts like "feminism" in bringing communities together, even as those understandings of radical feminism and community exclude vital others.

5.1.1 Gathering Land and Materials

Safety was a recurrent theme in how Tierra Madre residents narrated the motivations

[116] Volunteer applications, with permission to reprint anonymized responses. October 2019.

and purpose of their community, and understandings about how best to insulate themselves from external dependencies significantly shaped how residents designed community systems. The prospect that Tierra Madre might one day become a "safe space" for women was an ideal that was referenced often in daily conversations, particularly in discussions that drifted towards plans for the future. Tierra Madre residents expressed conceptions of such "safety" in both ideological and physical/corporeal terms. On a conceptual level, a "safe space" was one where residents were capable of espousing (and developing a receptive audience for) their radical feminist ideology. But this more abstract future goal was couched in concrete material and spatial terms, which were themselves shaped by prior life experiences. In a physical sense, Tierra Madre's land represented the material conditions that could underwrite autonomy, representing for residents a possibility to exist outside of perilous or life-endangering circumstances.

Although each of the residents of Tierra Madre had come to the space from different geographical and social contexts, each of their personal narratives highlighted the recurrent threat of gender-based violence. Two residents and key interlocutors explained that their families or hometown communities were dangerous places for lesbian women. One woman who grew up in a state on the eastern coast of Mexico discussed the harassment she faced on the way to work in her factory job, specifically by men referring to her (assumed) sexuality in their threats. Another woman described how she had sought refuge in Mexico in her late 20s as the result of persecution suffered during a right-wing dictatorship in her home country, eventually becoming a Mexican citizen. In these contexts, owning or having vested control over land where they were able to live, and work represented the possibility of carving out ways to thrive in hostile spaces.

For other residents, staking out physical space was a means to staking out conceptual space, particularly in the broader feminist community in and around Mexico City. Another

woman reflected that despite growing up in Mexico City–one of largest metropolises in the world–that she felt that there was no place for her, particularly as a lesbian woman with radical feminist ideological leanings. Other movements or communities, she explained, did not seem to represent her positioning to the issues ("LGBT is a movement that is made by men, and you are just a little 'L' in there," while ecofeminism was deemed "too spiritual…lesbianism is beautiful, but it isn't a religion, you know?"). Her interest in the idea of joining a community specifically rooted in radical feminism was in part a result of feeling alienated in this respect. She explained: "[In the city], I was really lonely. In my experience, I could not find community...I think we women are really scared to understand that liberty, well, liberty is also really lonely. You have to decide… no one can do it for you. And you have to live with your decision."[117] Residents often expressed frustration with the "victimhood" narrative that they felt had come to characterize much of the discourse around women's issues in Latin America, such as domestic abuse. Instead, they imagined that having both the physical and ideological space to express themselves "as women" was necessary in order to live without fear of violence or harassment.

The rationale and means by which Tierra Madre residents acquired the land where the community was being founded was not a topic that was specifically broached. However, some of the residents' reflections during interviews or unstructured conversations provided clues as to why this area was selected. In particular, the importance of rural space figured heavily into explaining the origins of the community and how they were initially drawn there. Residents narrated their experiences in urban environments as exhausting, dangerous, or socially and economically oppressive; in contrast, the rural landscape of the community-in-formation elicited sentiments of "liberty" and autonomy. This observation echoes Valentine's (1997) findings from rural lesbian separatist communities in the United States, in which

[117] Interview with Katrina, September 3, 2019.

"women idealised the rural in a political way– imagining it as simple, peaceful, safe space untainted by patriarchy" (111). For Tierra Madre, a project that had grown out of a lesbian feminist organization headquartered in Roma, the rural location provided a sense of respite both from the pollution or *machismo* common in city life, but also from the creeping gentrification and bureaucratization required to exist as a registered organization in the city. Founding the community on the outskirts of a rural town provided both a sense of welcome anonymity and sense of safety, but also more autonomy when it came to acquiring land and transforming it as they saw fit.

The desire for maintaining distinctness, both from mainstream feminist organizations and other ecological community projects, pervaded the ways that residents constructed Tierra Madre as its own place. Like many other ecovillages, Tierra Madre constructed their identity around the goal of being "self-sustainable"; by engaging in activities like growing their own food or harvesting solar energy, they sought to reduce the need for reliance on external resources. However, this goal was, in a way that is perhaps distinct from other ecovillages, not born from a desire to "reconnect" with nature but rather to "disconnect" from a patriarchal society. To be "self-sustainable," in the view of the residents, meant the ability to operate a functional livelihood without the presence of men, who community residents viewed predominantly as oppressors: "This project is about *liberty*," one woman told me while we worked together in the greenhouse, "not equality. Nothing they [men] have interests me."[118] To this end, making a living of sorts from the project's land–from selling food that was grown there, to holding workshops on *bioconstruccion* (natural building), [119] medicinal plants, or radical feminist discourse–was deliberately framed as an emancipatory project.

[118] Interview with Katrina, August 28, 2019.
[119] A form of building with natural materials such as cob, compressed earth, or bamboo, as well as recycled/upcycled materials.

5.1.2 Gathering Knowledge

In seeking to develop forms of agriculture to sustain residents in both alimentary and economic terms, Tierra Madre residents took a largely experimental approach. Only one resident had had prolonged experience working in agricultural settings, describing to me how she had worked alongside their parents in fields back home, or later as an invited temporary worker in the fields of Arizona. Before coming to Tierra Madre, she explained, she had little experience working in agricultural settings without the use of chemicals. Carola had experience in architecture and home design, and had studied *bioconstruccion* both on her own as well as taking part in workshops. However, her experience with the design and maintenance of agricultural spaces was limited to a small garden at her home in a nearby state. Katrina, having grown up in Mexico City, had no prior experience in rural or agricultural livelihoods; trained as a legal assistant and academic, she understood her value to the community as primarily administrative or organizational, although took on additional roles as needed. Residents relied heavily on information sourced online for the practical aspects of garden care, searching out tutorials on YouTube and other channels. The input of skilled workers and external parties was occasionally sought out, as was the case of a man from whom they acquired a bee colony or volunteers that would arrive. In general, however, residents deferred to Carola before undertaking any work in the garden, who herself operated largely from her personal experience maintaining a home garden, online research, and those with whom she consulted within her personal network.

In addition to having limited or partial experiences in working in agroecological spaces, community residents came to the task of planning garden spaces with very different kinds of expectations. Carola, for her part, envisioned the eventual creation of agricultural spaces that were *rentable*, or profitable. Handing me packages of branded, conventional seeds purchased at a garden center in a nearby city, she tapped cauliflower, squash, and

zucchini. “These are the kinds of things we should be planting so that we can sell them. These will sit well in baskets,[120] not things like lettuce and beans,” speculating that no one would pay higher prices for these kinds of organic produce when their conventional alternatives were widely available for much lower prices. Karina, on the other hand, tended to select seeds for planting that conformed to her individual tastes. Rummaging through a pile of assorted seeds in the grow house, she held up one excitedly to show me: “Oh! We should plant *this.* Have you ever had *huauzontle*?[121] I love this stuff!” In both cases, it was seen as necessary to get seeds in the ground as soon as possible, regardless of plant type or seasonality: “In Mexico, we are lucky because we can plant almost anything at any time…we don't have to worry about the cold like they do in Europe.” The ability to grow a diverse range of crops as quickly as possible was taken as a given, particularly because the community had the financial resources to purchase soil amendments, plants, seeds, and other materials outright.

Knowledge about gardening and other topics that were important to community daily life were sourced and compiled from a variety of contexts and media. YouTube and internet tutorials gathered by Carola provided inspiration for next tasks for the community, with this work sometimes assigned to other residents or volunteers. After watching an online video about healthy foods for chickens, Carola purchased sacks of alfalfa and other grains, as well as long plastic trays, for cultivating a mix of grain sprouts, which she expected could serve as a main dietary source for the chickens. At the time of my arrival, the goal set by two residents that worked most often in the garden was to replicate the effects of this covered area in the rest of the garden area through the construction of adjustable polytunnels. The strategy involved the use of plastic sheets, secured over a frame constructed by arcs of PVC

[120] This refers to the presentation of local produce in small health-food shops in Mexico City and nearby cities to which Carola aspired to sell their produce.
[121] Huauzontle [*Chenopodium nuttalliae*) is a species of edible plant native to Mexico, similar to amaranth or quinoa.

pipes, to protect seedlings and young starts from extreme weather. Carola had learned of the idea from watching short videos on blogs dedicated to "do-it-yourself" strategies for growing food sustainably. Being able to move the plastic sheets up and down would protect young plants from the intense summer rainstorms, she reasoned.

This attention to sensorial and experiential aspects of place also influenced the ways that community residents worked, or engaged with the work of others. For work in the garden, one resident described, it was said to be important to have a sense of "plant empathy," cultivating a sense of what each plant needs through individual communication. Carola seemed to promote this way of knowing above all others, including one resident, Karina's then-wife, who had worked on larger conventional agricultural operations, or the workers hired from the local town that often cared for their own *milpas* or small plots outside of their work at Tierra Madre. Failures in the garden–wilting squash leaves with mildew spots, or seeds that never sprouted–were interpreted as failures of "reading" the plant's needs and responding accordingly.

Gaps in understanding about how these species related with one another also frustrated attempts to build self-sustaining agro-ecological systems according to expectation. One time, Carola returned from a supply run with flats of assorted flowering plants from a garden center in a nearby city. "These will be good for the bees," she declared, directing us to plant them around a hive that had been sold to the community by a neighbor. Although Tierra Madre had recently acquired a beehive from a local seller and had purchased brand new equipment and protective suits for entering the hives, no residents had any direct experience with bee care. Tagging along to observe the first hive inspection a month after the bees' arrival, Karina expressed surprise when we found the super box[122] nearly empty, along

[122] A box in a Langstroth hive that is meant to be filled by worker bees solely with honey, by physically excluding the queen bee (which is solely responsible for laying larvae).

with an empty jar that had been filled with sugar water.[123] "Ok, this makes no sense. How are the bees hungry? We just gave them this," said Karina, wobbling the jar, "and we just planted *all* of these," gesturing to the newly transplanted flowers taking root in the ground in front of the hives. The emptiness of the box that Karina expected to be filled with honey seemed to be evidence that something was going wrong with their beekeeping practice

These kinds of clashes between vision and expectation could produce sources of interpersonal tension within the community. The rows of *huauzontle* planted to satiate Katrina's taste never sprouted, even after resowing the earth twice, while less palatable leafy greens thrived. The *tomatillos* staked to an elaborate structure in the grow house yellowed and slumped, while volunteers[124] of the same type thrived in garden beds outdoors. The failure of plants to perform or reproduce became material evidence, for Carola, of a lack of work ethic of those who worked in the garden. From her perspective, the greenhouse was stocked with all the materials to mix into a rich potting soil, along with white jars of insecticides and fungicides in gel form, and "good" seeds, coated in colorful powders toxic to insects that might eat them before they sprouted. What else could the land's failure to support certain crops mean, other than a lack of skilled attention? Residents who worked in the garden daily, on the other hand, realized that plants not growing was not for lack of effort. Rather, seeds and starts existed in a complex matrix of relationships, inhabited by *gallinas ciegas* and pill bugs, pet dogs and rain clouds. "If Carola would only listen, and just try with this land herself, she'd get it," one woman sullenly concluded as she tried in vain to hammer PVC stakes down into the hardened clay soil.[125]

[123] Supplementing (or "feeding") bees with sugar water is often practiced when bees have less access to foraging nectar in their surroundings. However, heavy use of the practice is controversial amongst many beekeepers.
[124] "Volunteers" refer to plants that are not directly seeded, but may spring up "by themselves." The term connotes the fact that the species is seen as beneficial, and may have even come from crops planted in that area earlier. For this reason, they are generally not culled, and are allowed to grow in place or are transplanted somewhere else.
[125] Field Notes, August 28, 2019.

5.1.3 Gathering Other Beings

I arrived at Tierra Madre approximately 8 months after its founding, when there was a flurry of activity in constructing the gardens. The primary garden space comprised about one-third of the land in total, mostly centralized in the back third of the property. There were about twelve garden beds oriented in rows, and a "baby *bosque comestible*" (edible forest) of young cacti, fruit trees, pomegranates, and raspberries. There was also a large grow-house, one of the first completed buildings on the site, which consisted of a metal frame and plastic sheeting walls and housed approximately ten beds. Running along the borders of the walls of the community was a deep channel, which ran along the borders of the property and ended in a deep pool, a reserve water source for the garden spaces.

The more-than-human others that Tierra Madre began to cultivate first reflected residents' visions for what they hoped their community would become. Some of the first plants that residents chose were not crops, but rather herbs, flowers, and shrubs, selected by Carola at regional markets and garden centers in the regional capital of Cuernavaca. Roses, lavender, succulents, and wildflowers were planted outside the homes still under construction and around the border of a natural swimming pool, one of the first installations on the land. Residents placed a strong value on creating spaces that were pleasurable to occupy and experience sensorially, for themselves as well as prospective paying guests. Elevated garden beds, constructed from deep planting tables and stacked plastic milk crates, were constructed outside of the greenhouse. What was cultivated in them was not so important for now, Carola mentioned. The important thing was that some garden spaces be accessible for older or less mobile residents, even if they did not live there yet.

Image 4. Dried earth bricks form a small bridge over irrigation channels, which were excavated across Tierra Madre's land to direct rainwater to a concrete storage pool. The channels did not fill with rainwater, but were often full of grasses and other young plants.

This focus on aesthetic or medicinal properties highlighted the vision of Tierra Madre as a potential site for healing workshops or "retreat" space. Unlike the fields of neighboring crops that boxed in the property (which had low wire fences or no fence at all) Tierra Madre was encircled by chain link fences reinforced with dark-green plastic privacy screens.

Resources for building up the gardens–including soil, plants, and tools–were largely purchased from external sources. Bringing supplies in "from the outside" was justified by the assumption that in time, the agroecosystems they developed would eventually *become* self-sustaining. Carola was one of the founders of the community who temporarily lived off-site during the construction phase, would arrive for a few days of week with supplies gathered

from garden supply centers in a larger town in the province. Carola would bring with her plastic flats of seedling starts–*ruda*,[126] oregano, mint– as well as sacks of *lombricomposta* (worm castings), coconut coir, and dried pats of dung to be mixed into material for filling new garden beds. In addition to young plants that were purchased for transplantation to the garden beds, seeds for starts were also procured on these weekly supply runs. Among the plants (attempted to be) cultivated during my stay in the community were chard, squash, tomatoes, carrots, radishes, beets, Brussel sprouts, as well as various chiles and herbs. The goal was to diversify the amount of plant life cultivated in each of the garden beds, establishing a rotation of different kinds of edible plants so that something could always be harvested from the garden. At this preliminary stage, however, much was under construction, and soils, plants, and raw materials for constructing buildings were still being purchased from external vendors at a fast rate.

While the project had a large pool of financial resources at the outset, there was a keen awareness that eventually, the community's sustenance would have to come from the land itself, rather than purchasing new items or supplies from outside. Bees were cultivated because they represented the possibility of a future income if they could start an operation for dividing hives or selling honey. Residents had sought out connections with local sellers of herbs and herbal products, and had mulled the idea of giving over a part of their cultivable land for supplying their partners with "naturally grown" products. Although many aspects of the community's shared facilities were still under construction, residents had prepared spaces for potential visitors at considerable expense, with the hope that the rooms could be rented out for weekend getaways from the city. These enterprises were prioritized among a host of pending projects because of their potential to generate income, with the understanding that

[126] Ruda (*Ruta graveolens*) also known as "rue," is a medicinal and savory herb native to Europe that is also found in Mexico.

profits could be invested in pursuing their other aims, such as free or low-cost workshops, or completing the library that was still under construction.

Residents chose what to cultivate based on the ways that they could be consumed or sold, but also for the kinds of services they were expected to produce. Plants were instrumental, for example, in systems for water catchment and filtration; for example, plumbing from the residential area was routed to an outdoor pool for treatment,[127] before being routed to other garden spaces. This small space was stocked with both cattails and water hyacinths, both understood to be good at "filtering" the water. While cattails are native to the region, the common water hyacinth (*Eichhornia crassipes*) are not; moreover, they are understood to be aggressive colonizers of aquatic spaces, particularly in Mexico (Martínez Jiménez and Gómez Balandra 2022). Because water hyacinth reproduces quickly, this area required regular maintenance–one of my first tasks while staying in the community was helping to pull back mats of the plants that had covered the pool's surface, and cart off the piles of discarded plant matter to the compost piles. This ability of the plant to reproduce quickly was valued precisely because of the plant's role in filtering effluent water, a vital need as the community prepared to host more volunteers and visitors (and hence, use more potable water). Whether or not it was an "invasive species" was not as relevant, reasoned the resident in charge of the garden spaces, as long as it was maintained appropriately.

[127] This is generally known as a "greywater" treatment system and common in permaculture design.

Image 5. Cattails and water hyacinths in an outdoor greywater treatment system, Morelos, Mexico.

Plants themselves were used as a way of building or strategically reflecting relationships to external actors. Once, a woman from the nearby community had come and left a small note with several young plants in plastic sapling bags at the gate. The note read: "Receive with affection these *casahuate* trees and a blackberry bush from Morelia. I also leave you a small economic contribution for the Tierra Madre project." Carola was moved, and posted a photo of the note alongside a hot pink ceramic piggy bank that had accompanied it on the project's Facebook page (Image 6).

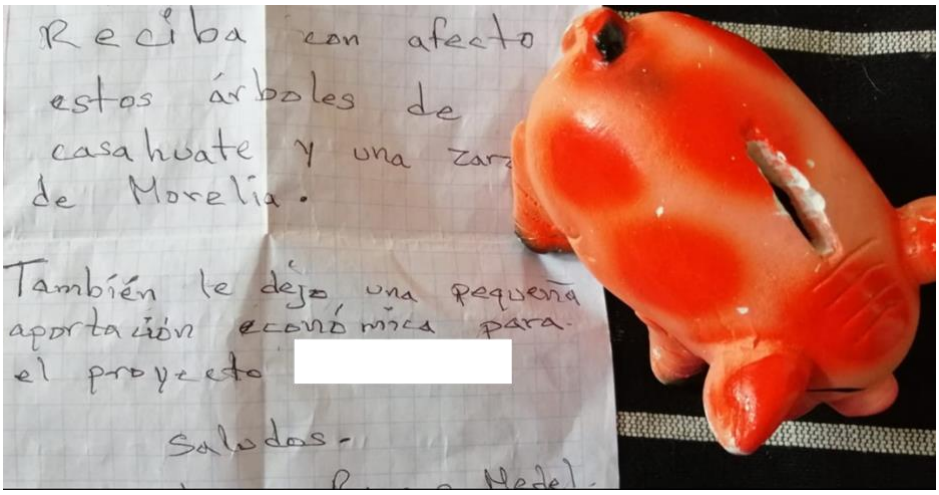


Image 6. A letter from a woman in a nearby community expressing support for Tierra Madre's project.

She planted them immediately, and took them as evidence of the local community's discrete approval of the project. The community was also gifted with approximately ten young raspberry plants in exchange for carrying out a short workshop in *bioconstruccion* at a permaculture demonstration center several hours away. Plans for new garden beds along a back wall of the property were scrapped, and the raspberries were slotted in instead. At the same time, plants were also utilized as barriers–both symbolically and physically. Growing crops for sale to external markets was suggested as a way to create economic independence for the community, as well as provide a renewable source of food. Additionally, young bamboo plants were planted along the canal encircling the property and around the reserve water pool. When mature, it was hoped that the bamboo would create a "green wall," screening off the community even more from the surrounding plots tended by their neighbors, creating physical distance with outsiders.

The barriers that Tierra Madre erected around themselves were superficial, however, reflected in the presence of unanticipated or unwanted beings or entities (e.g., pests, weeds, or pollution) that gestured to their land's prior social and ecological histories. On one of my first days helping in the fledgling garden, the soil teemed with life–spiders with bulging egg sacs, pill bugs, worms, small beetles. The soil was filled with inert life too–tiny bits of colorful, broken plastic surfaced with each shovelful of dirt that we turned over. Bits of the white plastic mesh woven into the white *costales* (sacks) that held the *lombricomposta* and coconut coir we used to mix soils for seedling starters were everywhere, in such small pieces that they became impossible to pick out. There seemed to be no discernable strata to the soil–evidence of the site's historical use as agricultural land.[128] Occasionally, we would find broken stone tools, or in one instance, a ceramic figure of a female torso and the "head of a

[128] Although the area surrounding the town had residential spaces as well as a small hotel and local shops, these developments are relatively recent in the town's history.

xoloitzcuintli,"[129] taken by Carola as a sign that they had constructed their community in a fortuitous spot. The evidence of the land's occupants (both past and present, human and nonhuman) gestured to the temporal and spatial porousness of the community, and suggested the ways in which life resists systematization and control. In the final section of this chapter, I explore how Tierra Madre's practices of gathering and exclusion were unmade by more-than-human garden residents: some invited, and others not. In doing so, I discuss what I understand as the "limits of care" in managing more-than-human others, particularly in communities like ecovillages.

5.2 Limits of Care: Life Transgressing Boundaries

Tierra Madre residents meted out care in distinctive ways, resulting in boundaries between certain beings (cared for or cultivated), and those that were not. This was particularly evident with Tierra Madre's population of dogs (initially, two), which had tripled in the year that their community had been under construction, supplemented by adoptions of stray dogs found in the surrounding area. Kiki and Mac were brought by their owners from Mexico City, and enjoyed a somewhat privileged position in the community space–dining with their owners in the kitchen, and sleeping indoors each night. Others, like Laika or Celia and her puppy, had simply shown up one day while the other dogs were being fed, presumably through tunnels burrowed along the back fences. These dogs often slept and ate outside, or left the property at night to roam nearby fields. Sometimes, just as quickly as they arrived, they would disappear.

The distinction between the kinds of dogs that lived at the community–those that had owners, and those that were collectively owned as "the project's dogs"–was one way that illustrated how care was partitioned and unevenly distributed in tending to more-than-human

[129] A breed of dog native to Mexico that is hairless and a common focus of pre-Columbian art.

lives. For example, residents welcomed and (occasionally adopted) some of the friendly stray dogs in the area, even using some of the pooled resources ("the project's money") to purchase large bags of commercial dog food for them. Dogs provided protection for both human and chicken residents alike, Katrina explained. She told me how months before, an animal– perhaps a fox–had broken into the chicken pen, and that having more dogs around would prevent a future chicken massacre. But Kiki and Mac enjoyed a markedly different status than the other dogs, traveling in their owners' vehicles on trips to nearby towns, or eating fresh meat purchased at the butcher's stall in the market square. The difference in treatment of the dogs reflects how the partitioning of care can fall along individual lives and individual relationships between residents and particular animals. While residents had an affinity for dogs in general, drawing distinctions based on ownership resulted in a dynamic where some dogs were made into helpful chicken protectors (rather than pets).

Understanding how and where lines of care in Tierra Madre are drawn calls attention to the qualitative differences with which residents regard nonhuman lives, and consequently how this impacts sustainability practices. The different ways in which Tierra Madre's dogs were regarded and took part in community life gestures to what Pitt (2018) outlines as a spectrum of relationships between humans and non-humans, poised by relative degrees between care and neglect (rather than a binary choice between the two). In the same way, gathering and excluding are not diametrically opposed modalities, whereby certain beings are selected, included, or tended while others are not. As Pitt (2018) argues, care for another being, particularly in the narrow sense of "meeting needs," does not always translate to ethical regard: "connecting with nonhumans can bring them within a moral community, but this ethical concern has limits" (Pitt 2018). Alternatively, as one Tierra Madre resident summed up: "It's what you dedicate yourself to, and you can't dedicate yourself to

everything".[130] Who or what lines of care are directed reflect an underlying politics of prioritization: of time, energy, affinity, attention, even love.

These patterns of care also reflected gaps between residents' expectations for other beings to operate in particular ways, and the realities of how those beings interacted with their environment. One example of this was in the way that Tierra Madre residents cared for their chickens. At Carola's instruction, Katrina–the lawyer turned chicken caregiver–regularly watered trays of sprouted grains which would then be added to the chicken's feed of dried corn. But Katrina encountered problems with this strategy: she mistakenly added too much water to the trays, causing the sprouts to grow moldy, and those that could be salvaged were ignored by the chickens.[131] A similar issue confronted residents in the garden, in the form of larval beetles known as *gallinas ciegas*.[132] Contending with the *gallinas ciegas*, which eat and irreparably damage the roots of young plants, effectively doubled the scope of our work: the fat white grubs would have to be plucked from the soil and squashed as we dug new garden beds, while also tending to young plants that the *gallinas ciegas* had already damaged. Because chicken care and garden care were distinguished as separate projects and lines of work, problems with the *gallinas ciegas* and the moldy sprout trays remained separate struggles. Because of the separateness of our practices, it took far too long to realize that we might have solved the others' problems–the chickens devoured a small bucket of *gallinas ciegas* that we deposited in their coop. By the time we learned this, however, the larvae had done their damage, and three garden beds were chalked up as a loss.

[130] Personal Communication and Field Notes, August 13, 2019.
[131] Field Notes, July 1, 2019.
[132] *Gallinas ciegas* (literally, "blind chickens") are a colloquial name for larvae of beetles from the genus *Phyllophaga*.

Image 7. Left: Ceramic remains found during construction of Tierra Madre, including what residents identified as a *xoloitzcuintli* head and a female torso. Right: Grasshoppers at the edge of newly constructed garden beds.

As the number of projects that Tierra Madre took on increased while the number of residents remained largely the same, the limitations of care became more and more obvious. A miscommunication between volunteers in the garden resulted in a broken faucet on a water cistern, and the hoses that had recently been purchased were too short to reach the garden beds, or had incompatible connections. As temperatures climbed in late spring, the heat wilted many of the young tree saplings and other crops. Without the necessary skills or knowledge to repair the cistern on hand, buckets were filled by hand from a large rainwater collection pool on the edge of the garden, and transported to each garden bed individually.

Difficulties with growing crops were not always reducible to human error or ignorance of “proper” technique, but also arose from the interactions between residents' efforts and the particularities of the local environment. Contrary to Carola's assertion that nearly anything could be grown irrespective of season in Mexico, the summer months of my stay brought strong thunderstorms that swept across the valley. The raspberry plants that had been gifted to the community arrived at a time when attention was strongly needed

elsewhere: tending to pests in the garden, and managing the simultaneous construction of two homes, a workshop, and a library/reception area. When time was finally found to transplant the now-wilted shrubs, torrential downpours the following evening battered the vulnerable leaves. The *huauzontle* that Katrina had planted for a future dinner never sprouted; whether because the seeds themselves were old or damaged, eaten by the flocks of small birds that arrived with the rains, or poor soil, was unclear. As we worked in other areas, tall grasses began to overtake the lavender and other flowering plants transplanted in front of the beehive, and they began to wilt. Limitations were both physical and temporal in nature; taking on several labor-intensive projects at the same time were physically exhausting, especially for the few residents that made the community their permanent home.

One example of how practices of care did not always work out as intended was the fate of the polytunnels that were constructed to shield plants cultivated in the garden beds. After working carefully to anchor sections of PVC pipes in the hardened, clay-heavy soil and lash plastic sheets down tightly over the low arches, our collective work was undone by one heavy thunderstorm several days after getting them in place. Heavy winds blew rain sideways, collapsing the PVC arches and compromising the strawbale walls of homes still under construction. Likewise, the opacity of the plastic made it difficult for sufficient light to reach young plants centered in the middle of the garden rows; even when the plastic barriers were lifted, the bundles created deep shadows across the garden beds. Finally, the barriers had the unintended effect of preventing human gardeners from being able to get close to plant roots and remove insects that feasted on them. *Gallinas ciegas*, shade-loving grubs that often tried to burrow themselves in the cool soil as soon as they were unearthed, thrived under the plastic canopies.

Working alongside two other residents involved in garden care, we changed our approach to meet the unexpected challenges posed by the construction of the PVC tunnels.

One resident suggested the use of diatomaceous earth, sprinkled around the roots of squash and beans to ward off the pill bugs that were damaging the roots. New, thicker PVC pipes were purchased from the garden center, and residents lashed the plastic sheet over the frame even tighter. At Carola's insistence, more attention was paid to raising and lowering the plastic "walls" of the polytunnel, and plants that had been damaged or uprooted during the storm were reinterred. Two of the small dogs that lived in the community–a boisterous puppy and a rebellious chihuahua–chased each other through the polytunnels when the plastic sides were raised, making it difficult to shoo them out of the garden space. After two weeks of having the polytunnels up, they were summarily dismantled, and the plastic sheets cast to the side, evidence of another strategy that had not quite worked out how it was intended.

5.3 Conclusion

Seeing theirs as a project of political and livelihood autonomy, Tierra Madre residents engaged in the ongoing "negotiation and foregrounding difference" (Roestone Collective 2014) between themselves and the social environments they left behind when joining the community. This distinction-making work had both conceptual and material dimensions: just as Tierra Madre residents worked to hone their ideological positionality as radical feminists, they also constricted their networks of social relationships–both directly and indirectly, with human and more-than-human others. The self-imposed limitations Tierra Madre placed on the audience their community might collaborate or live together with, for example, affected in turn the kinds of knowledge, resources, and alliances (both human and more-than-human) available to them. Tracing these lines of influence between value and practice suggests that the ways in which Tierra Madre residents "gathered" (and excluded) particular bodies was representative of an individualized discourse, particular to the community itself.

At the same time, I also show that these barriers are more porous and less definitive than the Tierra Madre residents might have believed. This was exemplified by the many ways

that forms of excluded life had a way of seeping back over the boundaries that residents had created or sought to create for themselves. These instances reflect the ways that more-than-human others resist or contest being "gathered," decentering human agency as the sole force underpinning the construction of sustainable communities. In the next sections, I continue to explore how this alternating process of boundary creation and transgression is implicated in building up different ecovillage communities, reflecting how distinctive narratives of sustainability emerge from different places and relational fields.

Bridge to Section II: Coherence

In Section II, I continue to explore the ecovillage-as-assemblage by focusing on the second assemblage process, coherence. Moving from this discussion in previous chapters of how various actors, entities, concepts, and contexts are brought together in the production of ecovillage spaces, this section focuses on how they are formed into community systems, structures, and patterns. This "coherence-making" work occurs on both conceptual and material registers, I argue, as place and knowledge are stitched together in ways that are particular to each community.

These chapters look to more-than-human others–both the ways they are configured, and configure themselves–as traces of the community construction process, and gesture to how distinct sustainability narratives and practices emerge from place. In chapter 6, I first develop an understanding of coherence-making, relating this discussion to theorizations of place and knowledge as mutually transformative. I bring two communities–Rancho Bosque and Aldea Ceiba–into conversation, highlighting how more-than-human others are mobilized in both individual and collective narrations of place. I refine these discussions in chapter 7, focusing on the Aldea Ceiba community to argue that diverse and (even seemingly) contradictory practices are brought together in localized contexts through practices of more-than-human care. Together, these chapters work towards an understanding of the epistemological and practical difficulties of putting "sustainable community" into practice.

Chapter 6. Coherence: Practices of More-Than-Human Placemaking

In my time in the community of Aldea Ceiba, I was charged with the responsibility–like all volunteers who lived there–of caring for a particular space in the garden. My area was a grove known as "*los algodones*" ("cotton plants"), so named for the saplings of *pochote* (*Ceiba aesculifolia*),[133] which produce in their fruits a silky material that resembled tufts of cotton.[134] The area was right on the border of Aldea Ceiba's land, before the forest began, and large enough that the work of watering it was divided between two people. I joined Sara, a volunteer from Mexico City, as a co-waterer of the *algodones* following the departure of Miguel, a local from a nearby city that was traveling home for a few weeks. Sara walked me through the area that would be my responsibility to care for, pointing out the boundaries between her parcels and mine. While the area was structured in irregular garden beds, the polycultural garden was filled with different species at different stages of growth: pineapples, coconut palms, mature papayas and *chaká* (*Bursera simaruba*) trees that had been transplanted here from the forest.

After several weeks of watering the *algodones* in the evenings, I began to realize that each person that walked through the space with me narrated it in different ways. While Sara didn't know the name of every plant, she relayed the bits of information that stuck out to her the most as she remembered them: pointing out the area I was to water and for approximately how long, she filled in the gaps by calling my attention to small plants obscured by weedy grasses, or areas that needed extra attention. When Miguel returned from his travels, he

[133] *Ceiba aesculifolia* is one of four species of the *Ceiba* genus that are native to Mexico, each of which produces "cotton." The largest of these four species, *Ceiba pentandra*, is highly significant not only in Maya culture, but also as a "spiritual keystone species" in Indigenous and Afro-descendant communities throughout the Americas (Tareau et al. 2021).

[134] Community residents collected the cotton-like material, particularly in late March and early April, for a variety of uses.

walked through and pointed out a few plants that we had neglected out of ignorance, noting the drooping leaves of a hidden lime tree, and describing how fast certain plants had grown.

However, when I walked through the garden with Pierre, a biologist and long-term resident, he told me yet a different story: describing where each plant had come from, and what it was doing there. "This *coco*, the guys brought it here from [the *cenote*] Las Palmeras, when it was already quite big. So now we've moved it here, but it's not doing so well." He pointed out a neem tree (*Azadirachta indica*) that had been moved by the edge of the forest, a transplant from a kitchen garden, and explained that they had moved it here to give it ample space and sunlight at the suggestion of some local community members.[135] These experiences reflected the ways that time spent in place changed ecovillagers' relationships to the landscape and the more-than-human others that inhabited it. While each community member caring for *los algodones* undertook similar practices (i.e., watering, weeding, or pruning), Pierre's long-term residence afforded him a perspective that encompassed seasonal changes, past patterns of trial and error, and a small window into the relationships unfolding between species that lived in the garden.

In this chapter I move on from a discussion of "gathering" practices developed in chapters 4 and 5, and instead turn my attention to understanding how community assemblages are "made coherent": that is, how residents construct and negotiate their practices of care within the context of place. With the understanding that ecological knowledge and place are inextricably entangled (discussed in chapter 2), "coherence-making" involves an interplay between the demarcation of space–and consequently, fields of relationships–and the associative, meaning-making work of interpreting those relationships. Tracing these processes of coherence-making, I argue, helps to explain how broader understandings of sustainability become rooted in and transformed by place.

[135] Personal Conversation, Garden Walkthrough [recorded audio], April 14, 2019.

I draw on findings from and comparisons of two communities–Rancho Bosque and Aldea Ceiba–in order to understand how residents think about and explain the more-than-human relationships that comprise their community. The structure of this analysis–focusing on place, knowledge, and again place–seeks to mirror the messy entanglements between the two, and in this way seeks to capture the reciprocal nature of what I understand as "coherence-making" practices. Drawing on examples from the gardens, pastures, food forests and orchards of both communities, I first explore how residents make sense of their communities through labeling and demarcation of space. I then highlight how the communities of Aldea Ceiba and Rancho Bosque differently related a shared priority (soil care and management), illustrating how different understandings of place are reflected in collective ecovillage practices. Further, I draw on results from participatory mapping workshops held in each community to explore how residents' diverse and partial experiences of place were rooted in the more-than-human others they cared for. Finally, I conclude this chapter by suggesting more-than-human others as coherence-makers in their own right, as evidenced by the ways that they validate and legitimate forms of knowledge and practices. I carry this discussion forward into chapter 7, where I discuss in greater details the consequences of more-than-human practices of coherence-making for human plans.

6.1 Making Places

The landscapes of Rancho Bosque and Aldea Ceiba–steep pastures carved from the Veracruz cloud forests, or the neotropical scrub and rocky forests of Yucatán, respectively–are quite distinct, both ecologically and geographically. These differences implicate distinct fields of ecological relationships, influencing the kinds of more-than-human others that ecovillage residents can cultivate and make use of. These fields of ecological relationships, in turn, inspire or permit new ways of relating with humans (bringing in new volunteers, partnering with local practitioners), knowledges (implementing particular strategies,

experimenting with a new practice), and more-than-human others. This positive feedback loop between social transformations and landscape transformations is similar to what Aistara (2018) calls "networked diversities," where "various past landscape imaginaries, also made for mosaic social networks" become folded into future practices and ways of relating (122). Within these fields of unfolding ecological and social relationships, more-than-human others become inscribed in community practices, knowledges, and narratives.

This process of placemaking is also guided (as I suggest in the previous chapter) by drawing boundaries and demarcating lines of care, which reflect distinct understandings about which relationships (or sets of relationships) were important to their visions of how a sustainable community ought to function. Mapping, marking, labeling, and enclosing spaces were not only practical functions of organization or land management, but also gestured to the interventions that each community made in relation to the landscapes they occupied. At Rancho Bosque, the land was divided into many small plots dedicated to specific uses, each marked with an alphanumeric code. In a master map produced by Rancho Bosque (Figure 8), many key areas of the community are labeled in relation to their corresponding more-than-human inhabitants: enclosures for the *jabalí* (boar) or stables for goats, or the *potreros* (pastures) through which grazing livestock are rotated. While certain areas are given general names ("*bosque*" [forest] or "*cultivo*" [crop]), certain plants are conspicuously noted: coffee (*Coffea arabica*), yucca (*Yucca gigantea*), and *huizache* (*Acacia farnesiana*). The attention to these species in particular hints at the important role of each in relation to broader farm systems: coffee was by far the most lucrative of Rancho Bosque's products, while yucca and huizache were used as important sources of forage for the community's pigs and flock of sheep (respectively). At first glance, the project's map appears to be solely a technical document, quantifying the different project parcels in square meters and delineating boundaries with red lines. However, the distinction and labeling of particular species

(including the uncultivated *huizache*) on the map reflected the centrality of livestock animals in Rancho Bosque's agricultural systems.

Through mapping and tracking landscapes through land surveys, rotation schedules, and spreadsheets, Rancho Bosque residents integrated individual experiences of caring for different more-than-human others into systems that were legible and accessible to all residents. Because different community members worked with distinct kinds of livestock, many worked only on the part of the land where their respective animals were scheduled to graze that day. Coordination of the livestock rotations occurred between residents, who kept their own logbooks and individual spreadsheets for tracking health data of their animals; these records were then compiled by Rodolfo or Francisco, who would adjust the rotation plan as necessary. The aim of this detailed record-keeping, explained Jens, was two-fold: one, to encourage residents to bring a deeper awareness to the animals they cared for through written observation, and two, to standardize units for measuring farm productivity (for example, by measuring the weight of animals relative to grass productivity by area).[136] In this way, maps and other record-keeping documents became tools for different Aldea Ceiba residents to synchronize their work with different species, and develop a common language for translating the economic value of their rotative pasture systems.

[136] Field Notes, Morning Meeting, January 14, 2019.

Image 8. A binder documenting vital information about individual sows, including age, weight, and dates and quantities of births.

Rancho Bosque marked and delineated community landscapes literally, through signs and barriers, and conceptually, by categorizing spaces according to how they related to the community's master plan. Laminated, numbered signposts, listing the area of the plot and a summary of crop and livestock rotations noted in a table on the opposite side, were placed at the corner of each parcel (Image 9, left). Residents referred to the signs during walkthroughs and tours of the community to demonstrate how part of the farm was integrated with others, and how landscapes and crop rotations had changed over time.[137] These divisions of space were also used in an advertisement Rancho Bosque printed in a regional agronomy magazine, hoping to attract new students for their apprenticeship programs and workshops by documenting their unique approach to agriculture. According to the table (Figure 4), the land

[137] Field Notes, Community Walkthrough/Tours, July 1, 2018, and February 27, 2019.

was divided into five categories, and about half the total land mass of a little over 17 hectares was given over to *cultivos* (cultivated areas) and *praderas* (pastures); the former supported humans (specified as "for self-consumption" or "for sale,") while the latter supported animals (*para los ruminantes*, or "for the ruminants.") The other half of the land–a little over 9 hectares–was listed as *bosques* (forests), a category subdivided into both "*naturales*" (natural) and "*reforestationes*" (reforested). The red text printed next to the table explained the value the forest contributed: "*para producir agua y oxígeno*," explained the forest's purpose printed next to the table ("in order to produce water and oxygen"). Making the area measurements of each plot visible was thus not only a way to label space, but to render the productivity or function within the broader agricultural landscape as a calculable figure.

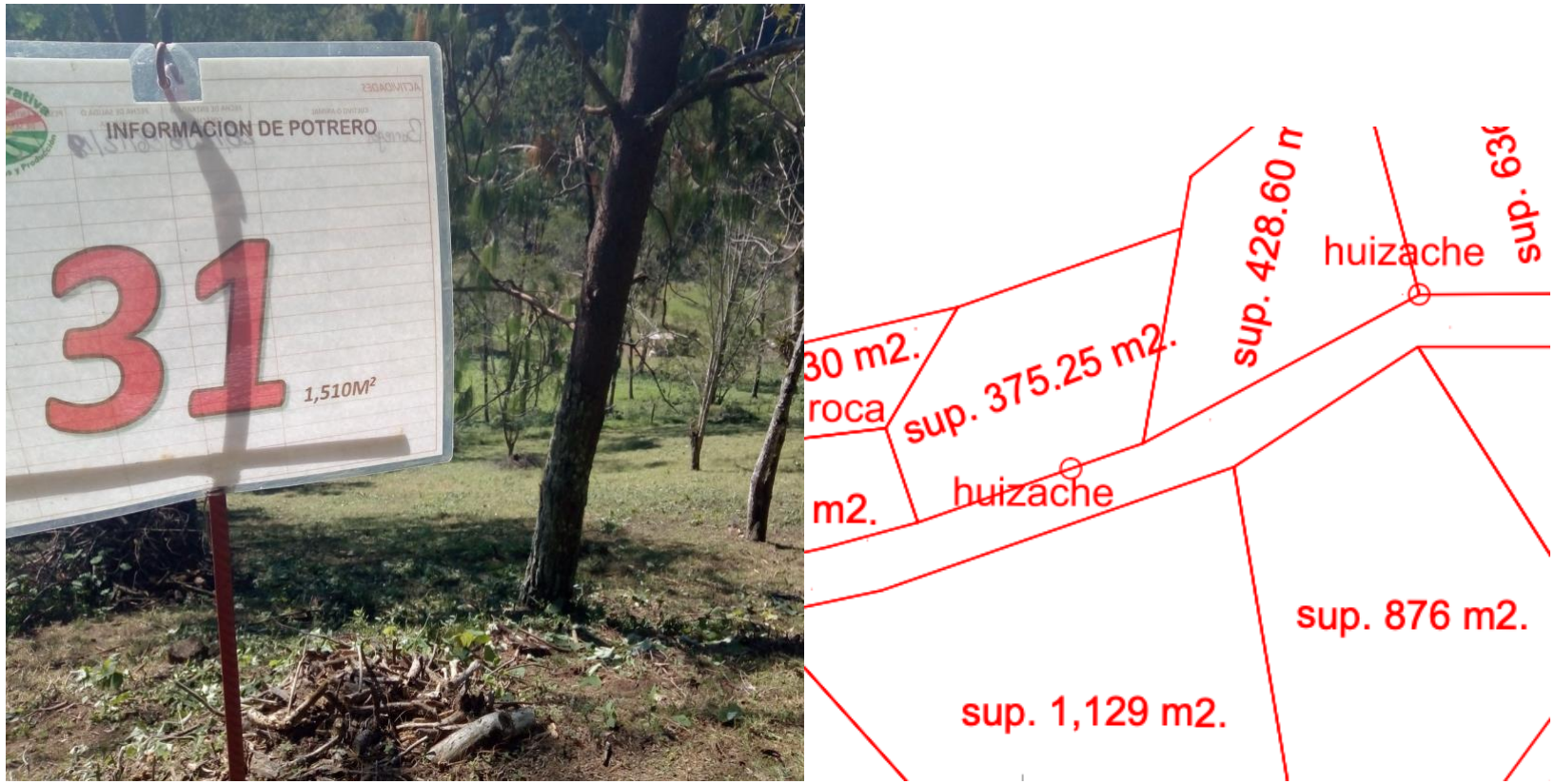


Image 9. Left: Numbered signs in parcels of Rancho Bosque ("*Información de Potrero*"), marked with the area and a table of past uses for the parcel on the reverse side. Right: Adapted survey map, showing *huizache* (*Acacia farnesiana*) labeled on the map.

Image 10. Selected portion of Rancho Bosque's survey map and site plan.

Rancho Bosque Land Use		
Purpose	**Total Usage (ha)**	
Forage Crops (Cultivos Forrajeros)	**1**	**for self-consumption (*autoconsumo)***
Corn, Beans, Taro, Chayote, Yucca, Potatoes, Clover, Alfalfa	1	
Pastures (Praderas Permanentes)	**3.4**	**for the livestock (*ruminantes*)**
For the 3 cows	0.4	
For the 30 goats (and their young)	1	
For the 40 sheep (and their young)	1	
For the 6 pigs in pasture (and their young)	1	
Perrenial Cultivation (Cultivo Perrene)	**2.55**	**for sale**
Coffee (*Caficultura*)	1	
Banana Plantation (*Platanal*)	0.25	
Fruit, Citrus, Macadamia trees; combined with sheep	1	
Garden (*Huerta*)	0.3	
Forests, Natural and Reforestsed (Bosques, Naturales y Reforestaciones)	**9.33**	**to produce water and oxygen**
Natural forest (*Bosque de niebla*), combined with goats	6	
Shrubland (*Matorales*), Water Reserves	2	
Reforested areas (silvopastoral)	1	
Wind breaks (pine trees in 5 sections of 100m)	0.33	
Pathways and Construction (Caminos y Construcciones)	**1**	--
Total (ha)	**17.28**	

Figure 4. Table categorizing the planned use of space by type. Adapted from a table documenting "Soil Use" (*Uso del Suelo*) at Rancho Bosque, published as part of a multi-page advertisement for volunteers and apprentices in the magazine *Agroentorno* for agricultural businesses and ecology.

Image 11. Sheep herds in cleared pasture of Rancho Bosque, with forest in background.

While the Aldea Ceiba community also possessed conventional survey maps that marked the boundaries of their land from neighboring parcels, these were referenced rarely, if at all.[138] Instead, many of the ways that residents understood and represented distinct areas within the community were in relation to certain more-than-human others. The task of watering cultivated parcels, for example, were communicated through references to a principal feature or species: coconuts (*Cocos nucifera*), *ceiba* (*Ceiba pentandra*), or *mamey* (*Pouteria sapota*). Each of the respective areas was not only home to these species alone, but rather contained diverse polycultures. However, the nature of the space used for cultivation– an unfenced patchwork of plots located in and between uncultivated forest–necessitated a

[138]The obsolescence of the property maps was exacerbated by the fact that the community had constructed so many new structures, features, and cultivated spaces that the map was no longer very accurate during the time of my stay.

shorthand form to communicate differences in space (for example, areas where certain species were unique or predominant). Before handing over the duties of a particular area to a new volunteer, a detailed walkthrough with an experienced hand was performed in order to point out the plants at the edge of each watering area, where cultivated spaces ended, and cultivated spaces began.

Image 12. The hive of *limón kaab* (*Lestrimelitta niitkib*), a native bee species, is marked in the hollow of a tree at Aldea Ceiba.

Other spaces of significance were marked through visual cues, orienting new visitors to areas of interest or spaces where key activities were carried out. Signs were posted at strategic junctures, noting principal gathering areas, the community's workshop, the *meliponario* (apiary for native bees) and the *gallinero* (chicken coop). While aiding newcomers to the community, signs also gestured to areas that were central in the community's practices and daily patterns of care: meeting with other residents, raising chickens, ducks, and turkeys, or tending to beehives. Signs also functioned as ways to call attention to other species that were less visible in the scheme of daily community life, such as the solitary bee species that nested in Aldea Ceiba's kitchen, or to the homes of other bee species located in the community. In the context of a community in which roles rotated often and residents arrived and departed almost daily, signs that called attention to such details served as ways to highlight areas where attention should be directed, as well as signal broader community priorities (e.g., valorization and conservation of native bee species).

The fact that not all cultivated spaces were labeled (for example, areas in between community structures that had been planted with edible *nopal* [cactus] and other native plants) further suggests how naming space functions as a way of focusing care in specific areas, drawing residents' attention to more-than-human relationships. Signs (and hence place labels) were not static, but rather emerged as particular areas became significant to the project of Aldea Ceiba. For instance, an experimental plot where residents tinkered with the application of syntropic agriculture principles was labeled with a sign after the strategy appeared successful, with trees and cultivated plants taking root and maturing (and as the design principles extended to other cultivated areas in the community). In this sense, named spaces do not only gesture to areas of vague "significance," but can also signify how particular practices of care for more-than-human others become central to broader community aims and sustainability narratives.

In this sense, how ecovillage residents gauged the success of their experiments with different practices was directly related to the kinds of more-than-human relationships and areas of the community were accentuated. Labels, signs, and markers serve as visual cues for highlighting practices of care, but also signified areas of knowledge that residents claimed mastery over: in other words, areas where experiments had worked out as expected, or aptly demonstrated the usefulness of a community's strategy to newcomers. As particular practices became legitimated through the framing of certain spaces in the community, these places themselves became central to the sustainability narratives constructed and shared by the community.

6.2 Mapping Knowledge onto Place

The epistemic contexts of each community matters for how community residents interpret and make sense of place. Residents within specific communities did not always share similar epistemological ground, despite the fact that the distributed nature of community care for other beings required close coordination. Rancho Bosque, for example, nominally practiced and espoused principles of biodynamic agriculture. In practice, however, residents varied greatly in the stock they placed in the agricultural approach as an explanatory model: when asked to describe his understanding of biodynamics, one long-term resident jokingly replied "bullshit".[139] Some residents, like community physician Benicio, were drawn to biodynamics because it resonated with their approach to spirituality. Benicio described his realization that "everything is energy, both positive and negative," and explained how following this vein of spiritual exploration led him away from working in a conventional hospital to alternative medicine: "I worked in a hospital for 22 years, and I thought that the knowledge I had could cure the world," he described. "But studying biodynamic agriculture,

[139]Interview, February 24, 2019.

you see that there are other forms of knowledge. We have scientific knowledge, and that works, but shamanism also works, witchcraft works."[140] For Benicio, it was easy to see how this energetic perspective could apply to agricultural work: "we need to be a bit more sensitive and conscientious, only transmitting good energy for example to the animals that we kill (*sacrificar*)…not only thinking, 'oh, now we're going to eat it.'" Just as positive energy could be transmitted through networks of relationships, so too could bad energies; according to Benicio, great care needed to be taken to dispel these sensations as they arose in the body in order to maintain one's general health.[141] This instance at Rancho Bosque (and others, as I discuss in chapter 9) revealed the centrality of energy and energetic balances in organizing practices of care.

In contrast, Francisco, the community's math teacher and a self-described "logical thinker," found value in biodynamics because it articulated his knowledge of math and physics. "I think biodynamics is sold as something spiritual," he told me. "And it's not really like that." Still, he saw parallels between particular practices and their underlying "scientific reasoning," allowing him to reconcile the more unconventional practices associated with biodynamics with their scientifically grounded rationale.[142] He described the task of dynamizing water, a common practice in biodynamics, whereby water is stirred repetitively before applying to the soil.[143] When stirring the water, he explained, "you're not creating or destroying energy, simply transferring it to the water. And so by making this physical force, it transfers this energy to the water, and when you put the water on the soil, it transfers this energy to the soil."[144] In this way, elements of biodynamic agriculture mapped onto differing modes of explaining relationships between other beings, and these understandings became

[140] Classroom Lecture, January 16, 2019.
[141] Personal Communication, February 13, 2019.
[142] Interview with Francisco, February 24, 2019.
[143] See also Pigott's (2020) description of dynamizing water in biodynamic practice.
[144] Interview with Francisco, February 24, 2019.

embedded in the landscapes of Rancho Bosque as residents made their communities into coherent places. Although residents might set out from distinct sets of assumptions and understandings of causality, occasionally (as illustrated by Benicio and Francisco's agreement on the importance of dynamizing water) residents could reach similar kinds of conclusions about the value of their practices.

Evening classes were places for collective discussion, where community members sought to cultivate particular "sensibilities" necessary for both practicing agriculture and living in the community. Apprentices, volunteers, and other residents at Rancho Bosque were often dispersed throughout the community and engaged in different tasks, classroom lectures became venues for consolidating the underlying themes that guided particular agricultural practices. Some evening lectures covered practical information for residents, such as math lessons offered by another resident to help others calculate the area of a pasture or calculate the output of animal products. Many of the lectures touched on themes that related with key concepts from biodynamic agriculture and the philosophy of "anthroposophy," both of which are credited to the Austrian thinker Rudolf Steiner. Antonio, a young man from Mexico City who often led evening chats on anthroposophy, explained that the purpose of the lectures was to "develop a sensibility–to be sensitive–in agriculture," in ways that were not always possible when residents were focused on discrete tasks, like milking cows or cutting back weeds.

In one evening discussion, Antonio began by drawing a three-pronged form on the chalkboard as he discussed the importance of positive thinking. As he talked, he began to label each corner with different words; "feeling" (*sentir*) and "thinking" (*pensar*) near the top of the figure, and "will" (*voluntad*). Antonio explained that each of these states correlated to a different element in the natural world, adding "water" (*agua)*, "mineral" (*mineral*), and "astral" (*astral*) respectively to the board. "Water is the conductor of all emotions... So,

when we are dynamizing water, for example, we're *drawing up* this *voluntad* into the water– the material substance." Antonio opened the floor to comments from the assembled residents, and one young man spoke up: "I feel like *voluntad* is really at the center of what we do [with agriculture] ...you can work the farm just to make money, but if you don't have good intentions at the center, then it's not going to keep working in the future."[145]

The exchange in the classroom reflected some of the linkages between the community's approaches and the practice of biodynamics, but also revealed how the principles of biodynamics were not so much applied as they were creatively interpreted and resituated in the context of Rancho Bosque. The distinct planes of the human experience, as illustrated by Antonio's diagram, appear to reference a 1921 lecture given by Steiner entitled "Thinking and Willing as Two Poles of the Human Soul-Life." In the talk, Steiner argues that humans cannot understand the world only through logical deduction (which he describes as "related to the past"), but through the development of sensorial faculties ("surveying the tapestry of senses") in order to navigate and tap into the unfolding relations of the natural world (or "the changing pictures of the sense world") (Steiner 1921). Antonio's delivery of the material, however, reflected the unique position that Rancho Bosque was in at that moment: several interpersonal conflicts, some that had resulted in abrupt departures that left gaps untended in the gardens and pastures. The breakdown of social relationships between residents became visible on the landscapes themselves, reflected in overgrown pastures and terraces and sporadic harvests of ripe coffee beans and macadamia nuts. In the discussion following Antonio's lecture, biodynamics became the backdrop on which these emerging community issues were projected. Rodolfo and Benicio used Antonio's lecture as an opportunity to lament the departures of volunteers and residents, interpreting this development as a sign that the younger generation had begun to value instant gratification

[145] Field Notes, Classroom Lecture, February 18, 2019.

and the allure of the city over difficult, but personally rewarding, farm work. Rodolfo explained that "some things, you learn not by memorizing, but by observing and investigating and feeling. That's the source of inspiration for this [community], to be an 'active school.'"[146]

In Aldea Ceiba, on the other hand, community members understood knowledge construction as a co-creative process–drawing inspiration from multiple sources and alternative agriculture frameworks. Many of the *semillas*, the founders and permanent members of the community, often described their community as a nexus for knowledge exchange (*intercambio*). While Aldea Ceiba also held regular evening lectures, workshops, and classes, topics were devised by residents themselves, ranging from Tai Chi to philosophical debates, trust-building exercises to jewelry-making workshops. Aldea Ceiba had an experimental approach to agriculture.

Initially inspired by the principles of permaculture and agroecology, Aldea Ceiba residents had adopted a mix of strategies from the regenerative agriculture toolkit, building raised beds, starting compost piles, and planting perennial food forests. This patchwork approach to agricultural knowledge was reflected in the landscape of the community, where different zones interspersed throughout the community reflected ongoing forms of experimentation with different strategies: the transplantation of tree species like *chaká*, the application of organic matter and *biochar*, or experimentation with different configurations of cultivated polycultures. Challenges to these plans (which I discuss further in chapter 7) instigated further exploration into the efficacy of particular practices in place, and in some cases, revising their approach. While the first attempts at cultivating *hügelkultur*[147] raised

[146] *Ibid.*

[147] "Mound culture," referring to a practice where decomposing logs and other organic material serve as the basis of cultivated beds.

beds were challenged the conditions of the soil and the lack of available organic matter,[148] Aldea Ceiba's chief gardeners shifted course, exploring other options that would be more applicable to their community's context. After one portion of the food forest garden began thriving after gardeners began to experiment with "syntropic agriculture," the approach was applied to parcels across the community's property, later coming to form the basis of workshops that residents held for visitors. This gradual shift towards new strategies and practices was underpinned by residents' emerging understandings of what "worked" and what did not.

The residents of Aldea sought out expertise from outside the community, particularly their neighbors in a nearby indigenous community. Patricia, a relatively new beekeeper in the community of Aldea Ceiba, began taking courses from a local beekeeper who practiced traditional cultivation techniques. Through the support of the community's pooled resources, Pierre was able to attend intensive workshops at a well-known agroecology demonstration center and ecovillage in Veracruz. Some residents worked closely with the community's neighbors, learning the names and uses of local flora and trading plant cuttings and seeds from their back gardens. Above all, residents valorized the ecological knowledge of their indigenous neighbors, and often made a point to defer credit for the success of their gardens and other projects to them: "This project is *for* them, and it's because of them," Gonzalo told me plainly.[149] Gloria, one the *semillas*, discussed in an interview how conserving indigenous knowledge played an important role in the projects Aldea Ceiba had initiated in the local community, including supporting the development of a women's sewing cooperative or after-school workshops and activities for local youth. She explained that the economic situation

[148] While a low amount of organic matter is common in neotropical forest soils, scholars suggest that land-use change in Yucatán (specifically, shortened cycles of swidden agriculture from 25–30 years to 6–12 years [Weisbach et al. 2002]) has also significantly impacted levels of organic matter in the soil. See also Urquiza-Haas et al. 2007 for further discussion.
[149] Interview with Gonzalo, April 23, 2019.

had led many local people to pursue careers in tourism, or the tertiary sector of the economy (*economía terciaria*):

> This makes it so that the people, and more than anything the young people, the younger generation, they already don't transmit nor reproduce this knowledge that, for hundreds of years or thousands of years, have maintained their living culture, in this cultural diversity. And so, my interest is that transmission…that intergenerational transmission. Because I think that to conserve those knowledges, to refresh (*actualizer*) them to the existing context, and to transmit them, it's… an important key for the projects that we are generating to be able to sustain that connection.[150]

In this sense, Aldea Ceiba residents saw their community as a mutually beneficial enterprise, contributing both to the development of more sustainable lives for themselves, as well as facilitating opportunities for cultural exchange.

However, this does not mean that all forms of external knowledge were valued equally. Residents sometimes expressed doubts about the transferability of newly encountered strategies or practices in the context of their community, highlighting the importance of place in shaping what kinds of strategies were pursued. New arrivals, eager to share their experience working in other agricultural projects or ecological communities around the world, come prepared to contribute, and often share a lot of suggestions. As one long-time ecovillage resident at Aldea Ceiba related to me:

> We have a lot of [volunteers] that visit a lot of other ecological projects, and they get shown around a lot, and they see the same things happening…you know, like...like the weeding, composting, compost teas, you know these are all different names of different techniques that you hear once and again from people that come from far away. And, even us…when we started, we were like these are like the main things that we need to apply there, as well.
>
> But it's been hard...for people from the outside to come and ...well, not propose things, because people proposed a lot of alternatives or things that we can do, or not do, but it's been hard to apply them [in] the field. Like for us, when we first came because, a lot of those techniques and knowledge comes from different regions of the world, different climates. And so yeah, a lot of the things, the recommendations, and just...in general ideas about how things could be done, by people that come...

[150] Interview, April 21, 2019.

Sometimes don't apply.[151]

While long term residents acknowledged that volunteers and their knowledge had an impact on their practices, what counted as "useful" knowledge depended on whether it resonated with long term residents' experience working in place. One long-term resident from Germany recalled that once, a German couple had arrived that were "quite a bit older than the normal group here...maybe in their 40s or 50s?" [152]He had spent time at ZEGG, a renowned ecovillage outside of Berlin, and had experience with using biochar, a practice that Aldea Ceiba residents had adopted in their gardens. The couple had suggested some changes to their system for biochar production to make it more efficient: most notably, dousing the burnt organic material with urine in order to "turn off" the combustion process. "It had a really big impact on the way we make biochar, which we used for composts, in the composting toilets, in the garden," he explained. "We're really open to ideas when it helps us tweak existing systems. In that case, it's like, 'thank you for your knowledge!'"[153] This example shows that knowledge from other places was still valued and absorbed into community narratives, but often only if these practices conformed to or help refine already existing community practices.

Other times, input from volunteers was listened to, but accepted half-heartedly in the context of prior experience in place. In an informal discussion about working with volunteer residents, one long-term resident noted that: "we welcome suggestions, but don't you think we've heard it all before? We've been doing this for...years. You don't see the experimentation that we've done before to get where we are." He cited a case where a volunteer had come and suggested using fine rocks and sand, collected from an area at the edge of the community, to line the garden pathways with rocks. It would look nice, they had

[151] Interview, June 23, 2018.
[152] Volunteers and visitors of this age were rare in Aldea Ceiba, where the average age of residents was often mid to late 20s.
[153] Field Notes, April 17, 2019.

reasoned, and it would be easier to traverse the forest paths connecting different areas of the community without tripping over a rock or a root. The residents assented, and offered the volunteer a wheelbarrow. After three days, he told me, the volunteer stopped and chose a different daily chore. “Why'd they stop? Because it's hard work!” he laughed. “You need to take the tools yourself, lift the rock into the bucket and bring it here [to line the path] by yourself load by load. And also, we usually walk these paths barefoot anyway. Then you see why we didn't do it already... it doesn't make a whole lot of sense.”[154]

As ecovillage residents developed a keener sense of their surroundings and ways of working with more-than-others, these individual relationships and practices of care became more embedded in the landscapes of their respective communities. In other words, as residents spent more time in place with particular more-than-human others, they gained experiential knowledge that influenced how they cared for other beings, which in turn influenced the social life of the community (i.e., division of labor, social importance of particular individuals, etc.) Rancho Bosque, for instance, often partitioned responsibilities for animal care by species, with different residents or groups of residents caring for particular animals. Although the initial intention was to rotate residents through various roles to gain skills in managing all parts of an “integrated farm community,” residents often settled into roles over longer periods of time as a function of the expertise gained in their respective areas. While multiple residents had experience with castrating sheep or leading a flock to their respective parcels, Alejandro–the resident charged with their care in the last months of 2018–became a lead figure in sheep care as a function of the amount of time spent in the stables and in the pastures.

By caring for the sheep daily, and weathering the flock through periods of illness, bad weather, and a host of other issues, Alejandro gradually became the community’s resident

[154] Field Notes, April 13, 2019.

sheep authority to which other community members deferred. Alejandro's experience with the flock allowed him to accomplish tasks like conducting health checks more easily, since he could recall the recent health histories of individual sheep by appearance (and not by checking the numbered plastic tags marking their ears). While Alejandro kept records of grazing rotations that could be shared with others in a daily logbook that each resident kept, these notes did not always account for his daily improvisations, like swapping one parcel in the schedule for another because of inclement weather or an overabundance of weedy vegetation. Alejandro's ability to care for the sheep emerged primarily not through learning with skilled practitioners (a core principle of Rancho Bosque's mission), but instead through in-depth attentiveness and proximity to the sheep and their relationships. These situated practices of care again gesture to the ways that human and more-than-human residents shape landscapes collaboratively.

As residents became more attuned to the dispositions, needs, and life histories of the animals they cared for, transferring this knowledge to other community residents was not a simple or straightforward task. Reconciling these divergent understandings of and approaches to agriculture became possible because of residents' shared senses and experiences of place. Because ecovillage forests, gardens, and pastures are understood as spaces of experimentation, residents understand the success or failure of particular approaches in terms of their applicability to the context of their community, legitimated by their value in practice.[155] Broader approaches to alternative agriculture–biodynamic agriculture and syntropic agriculture, here–provided a shared language for each community to express their values and practices, and are reified through community events, such as evening lectures, workshops, and chats. But in habitually caring for particular beings or groups of beings, individuals gain kinds of knowledge that cannot be easily replicated or transmitted to new

[155] See chapter 4 for further discussion.

residents as a set of instructions or causal sequences. Instead, individual ecovillage residents learn ways of "composing" with more-than-human others through their patterns of daily work and engagements with the landscape.

Understanding how different communities arrive at different kinds of conclusions despite their ostensibly similar goals (e.g., developing "sustainable places") requires a closer look at the localized politics of knowledge that shape these narratives. The process of coherence-making–of stitching together practice and place, as both are framed and transformed to fit the other–plays out on both individual and collective registers, in ways that are (or become) particular to each community. This is rendered traceable, I argue, through the ways that more-than-human others are implicated in performances and practices of sustainability. In the following sections, I discuss two forms of "mapping out" coherence-making processes: how both communities collectively narrated a common entity (soil), and how individual residents at both communities understood their communities from a more-than-human perspective.

6.3 Soil Stories: Collective Coherence-Making

When most visitors and volunteers arrive to the community, their first introduction to the space is often a "grand tour" led by one of the longer-term residents. This introduction included not only an orientation to the structures, landscapes, and people, but also to the broader ideals and values that community residents claimed. As I spent more time in each community and had gotten more of my bearings, I began to join in on tours that residents would provide to new arrivals–volunteers, classes of students, scientists, or representatives from nonprofits or local government. In carrying out this role as facilitator and interpreter of their own spaces and communities, ecovillage residents become adept at narrating their livelihoods in ways that are legible to diverse audiences.

Listening to these stories over time, it became evident that while the key points of the

community's story remained roughly the same, each resident had a particular way of framing and narrating the community in their relation to their experience in it. Founding residents would stop in particular places, pointing out where they had gathered materials for constructing buildings, or what the vegetation had looked like when they started cutting it back. Others would pay special attention to the areas or creatures that they worked with and cared for, pointing out details that they knew from their work in the community: insects on the undersides of leaves in the garden, or which animals were feeling ill and in need of extra attention. In this way, residents construct their communities in a physical and conceptual sense through caring for more-than-human beings.

Despite their differences, residents of both communities identified a common component of their respective agricultural systems: soil. At Rancho Bosque, Rodolfo would lead a curious school group or a newly arrived apprentice to the top of the steep road that climbed sharply through mountainous pastures to the top of a large hill. The spot provided a sweeping panorama of the forest canopy surrounding the community and a terraced hillside below. “We plant like this,” he said, gesturing to the view “to prevent erosion–sort of like in China, if you've seen the pictures of how they plant with terraces,” he explained. He pointed out where the river carved through the forest below and mentioned that the area received a lot of rain; “If we didn't do this, the soil would be carried away completely,” he said.[156]

As he continued pointing out the pastures and garden spaces from this vantage point, Rodolfo would periodically loop back to discussing their community practices in terms of the benefits to the soil–he described how the livestock they cared for produced manure, a central ingredient for productive composts, or how the trees planted on the edges of parcels would hold water and biomass in the soil, leading to healthier gardens. When I remarked on this and asked him to reflect further, he smiled and shrugged. “Taking care of the soil is like taking

[156] Tour [Field Notes and Recorded Audio,] February 27, 2019.

care of the future–your future, the forest's future, the world's future. This system, I'm telling you, is so impressive, it gives a lot of food. Why? Because we're applying manure *every day* to the soil, and that makes it so the fertility increases. The soil is so important (*importantísimo*). From there comes practically everything," he said, pausing for a moment for emphasis before continuing his tour.[157]

Soil represented a useful entity for residents to articulate the intersecting relationships between other beings and areas of the farm, and thus became an important component of the community's overarching sustainability narratives. For Rancho Bosque, this discussion of the importance of soil was interwoven with how they described their practices of caring for livestock. Residents described their rotational grazing system as creating a balance between the animals and their environment, providing multiple ecological services as livestock were continuously moved from pasture to pasture. Pausing in front of the cows while another resident milked them in the field, Rodolfo described how their integrated approach to working with livestock was based on maintaining a series of balances with soil at the center. If the soil is productive, he explained, then the grass will be more nutritious for the cow and the microorganisms in their gut, which in turn led to better quality milk and even more fertile manure for composts. Better quality grass, he continued, also meant their animals did not have to be treated for parasites as often, and meant that less antiparasitic medication entered the topsoil by way of their excrement.[158] The practice of caring for grasses and soils as a way of caring for their livestock, which in turn implied care for soil (i.e. through the production of manure[159]) illustrates the "ripple effect" of care practices that serve as the foundation for broader sustainability narratives (a point to which I return in chapter 7).

Different animals had distinct kinds of interactions with soils, and were framed in

[157] Field Notes, February 27, 2019.
[158] Personal Communication, February 13, 2019.
[159] See chapter 9 for further discussion.

terms of the complementary benefits each provided within their respective areas. One stop on the tour is in front of the parcels for pigs, in a low valley that borders the forests. The damp soil and shade make it an ideal place for growing roots, like the *malanga*, residents pointed out. Federico, a young man that looked after the pigs regularly, would explain to groups how the rotation of pigs and root crops were planned together. “After harvesting, there are always some roots left over in the soil,” Federico said. “When we move the pigs there, they root for the tubers in the soil. They give the soil a turn, and give it air.”[160] Cows, on the other hand, were placed in pastures where they could not disturb the soil. Because the cow's physiology made it difficult to eat grass below approximately 5 or 6 centimeters, they were only rotated through particular pastures and when the grass had grown to 10-15 centimeters, in order to avoid them pulling grass up by the roots with their long tongues.[161] The rotations of the cows and the pigs through the pastures reflected these individual relationships each animal had with plants, and by extension, soils.

[160] *Ibid.*
[161] Personal Communication [Alejandro], January 30, 2019.

Image 13. Parcels at Rancho Bosque separated by electrified wire, with pig pens to the left and *malanga (Xanthosoma sagittifolium)* to the right. The pigs will be progressively rotated to the right as the *malanga* matures, ensuring a steady supply of food.

Soil was also an important theme in the classroom of Rancho Bosque. When a welcome lecture was prepared for new apprentices that arrived in early February, Jens began with a lecture on soil, declaring that "besides providing both food and ecological services, the benefit to the soil was "the most important part of our work with animals."[162] He passed around handouts to accompany his lecture, quoting an article on soil from the German newspaper Die Zeit that he had run through an automatic translator, with a small reference to the author at the bottom and a large Rancho Bosque logo added on top. The piece, on life beneath the soil service, described the sheer vastness of the microorganism community at work in recycling organic matter into plant nutrients: "the digestive power of this microcosmos," began a section that Jens bolded and capitalized for emphasis, "creates the

[162] Field Notes, February 7, 2019.

nutrients that make the grass grow and assure our life as well."[163]

Here too, the relevance of the lesson was framed in terms of the work of animal agriculture. Jens compared the length of earthworm tunnels estimated in a square meter of soil (one kilometer) to the length of the distance walked each morning to the pig pens, at the farthest edge of the Rancho Bosque property. At the end of a selection of quotes from the essay, Jens had added his own rough math: "In one m² there can live between 100 and 400 earthworms. In one hectare of pasture, can live up to 3 t[ons] of worms, which produce up to 600 t[ons] of excrement a year. In fallow soil, they produce between 40 and 100 tons of manure per year and hectare." Jens emphasized these figures as evidence[164] that caring for livestock–in a managed, rotative pasture system such as their own–was ultimately more beneficial for restoring soil fertility than other comparable practices. Because earthworms appeared to produce more castings in fields where animals lived, animal agriculture could be rendered as a form of soil amendment, given that "worms support plants, which supports animals, which supports us."[165] In this sense, the productive potential of the soil became legible through the work that residents did with animals.

Tours around the community of Aldea Ceiba also focused on soil, but in different ways and in different contexts. As Gonzalo guided groups of visitors around the community setup in the forest, he made a point to stop at the composting toilets, a two-level structure consisting of two elevated, thatch-walled toilet stalls above, and two receptacle chambers below. "This is the engine of Aldea Ceiba," he would say with a wink, sweeping his arm behind him to show off the admittedly charming little building. An "engine" was an interesting word for what it was: a composting treatment system that separated and recycled human waste. Human urine, high in nitrogen and therefore beneficial for plant growth, was

[163] Soil Handout, February 11, 2019.
[164] These calculations were not attributable to the article.
[165] Field Notes, February 11, 2019.

collected separately from excrement and funneled into heavy-duty plastic jugs stacked outside the structure. Ultimately, the tanks of urine were diluted with water, and applied manually in the gardens and to the bases of fruit-bearing trees as a fertilizing supplement. Human excrement, on the other hand, was covered over after each bathroom visit with handfuls of dried leaves and ash in order to transform it into "*poposta*,"[166] a form of extremely rich compost that was useful for fruit trees and other plants that would not be consumed directly.

The composting toilet was one of several soil projects in which Aldea Ceiba residents were engaged at any one time. Aldea Ceiba residents regularly made *biochar*, or charcoal created from combusting organic matter in low oxygen environments, which provides multiple benefits for the soil: filtering effluent water before it is redirected to the gardens, holding water and carbon in the soil.[167] Biochar was processed as needed, or whenever there was a surplus of fallen branches or stray bits of wood. One resident whose role focused on composting maintained several piles in varying states of decomposition around the land, all of which needed to be regularly turned, covered, and moved to the garden once complete. Kitchen scraps were also processed by feeding them to the larvae of black soldier flies (*Hermetia illucens*), cultivated both as animal feed and because of their role as decomposers. Besides composts consisting of kitchen scraps, there were also composts of *poposta* that needed managing. The microorganism "tea" that bubbled in aerated tanks and the piles of *bokashi* fertilizer in the community workshop were each destined to end up in different corners of the land, depending on the kind of plant it would be applied to and at what stage in its growth cycle.

Residents at Aldea Ceiba narrated their role in building up soils as a matter of

A portmanteau of *popo* (poop) and *composta* (compost).
[167] See Kwapinski et al. (2010).

ecological repair. Converting waste into rich soils was understood as a retributive act–not because the forest soils were inherently "poor," but because the creation of *sisal* plantations throughout the peninsula centuries ago had rendered soils temporarily lacking. In daily community life, it was frequently reiterated that in the forest, we (humans) were in a predominantly nonhuman domain,[168] and that nature would be "just fine" on its own, without human intrusion. They justified their presence, however, by emphasizing the ways that their work contributed to the betterment of the community space for other beings; in this case, the ways that human organic waste could contribute to the development of fertile soils. These instances revealed the somewhat contradictory role that ecovillage residents afforded to humans in their sustainability narratives. While maintaining a division between humans and nature was seen as important for conserving wildlife or allowing natural spaces to "regenerate," ecovillage residents also framed their own involvement in changing and managing their land positively because it was directed towards ecological repair.

Soil was also a common thread running through the daily life of Aldea Ceiba, constituting a distributed community-wide effort that spanned multiple projects and kinds of expertise. For example, soil was commonly represented and discussed in Aldea Ceiba's workshops and educational seminars for visitors. The topic was featured as a two-week residential seminar that Aldea Ceiba residents designed as part of an apprentice program, where visitors were taught about the role of healthy soil in small agricultural systems as well as how to prepare different kinds of compost. During practical lessons in the workshop, Pierre would point out the various composting strategies they used and why they were important, prompting workshop participants to fill in the details and relate them to the bigger picture:

[168] This was usually the case when a potentially fearsome critter was encountered, including rats, insects, and arachnids.

> P: When we're talking about the fertility of the plant, what do we want…what's better, giving nutrition overall to the soil or directly to the plant?
>
> Z: ...the whole soil?
>
> P: right, definitely yes. Because giving nutrition to the soil is going to increase fertility in the long term. And if we think about everything around [the plant] as an organism, that it is healthy. If we feed each plant individually, we disconnect them from their environment, right? And so, [this latter system] might give good fruits, but it's going to produce other problems as well...illnesses, there's going to be imbalances, *plagas*...

This emphasis on maintaining "a balance" (*equilibrio*) within the agroecosystem resonated with sentiments I had heard from residents of Rancho Bosque. Unlike Rancho Bosque, however, Aldea Ceiba did not frame soil fertility in terms of livestock care (the largest animal that Aldea Ceiba residents cared for on their land was a charismatic tom turkey), nor in terms of precise micro-rotations through space. Instead, the community focused on establishing perennial agroforestry systems, whereby larger trees are left in place over long periods of time. In touring visitors around the property, Pierre would pause in the syntropic garden that he designed in front of the dining area, characterized by plants of varying sizes planted in close rows. As one group's attention drifted to the enormous *ceiba* tree that towered over the garden, Pierre drew their attention to how the different heights of the plants formed distinct strata: the dappled sunlight cast by the *ceiba* onto the papayas, corn, and squash. Pierre explained how at certain times the trees would be strategically pruned, providing more sunlight to the crops below as well as a "green manure" cover. Such a system, he explained, was designed to mimic patterns of forest succession: "what is seen, is what would happen naturally in an ecosystem."[169]

These different stories about soil as told by Rancho Bosque and Aldea Ceiba shared some general similarities, but hinged on different species and kinds of ecological processes in their telling. Maintaining a balance was emphasized in both settings; it was also generally

[169] Field Notes, Walkthrough of garden, October 19, 2019.

agreed that soil-building was a collaborative effort of insects, microorganisms, flora, and fauna acting in concert with one another. But the ways in which each community incorporated this priority of soil regeneration into their larger agricultural projects differed greatly. These stories about soil, and the more-than-human others that they include, also visible and material impacts on the landscapes around them: Rancho Bosque's sweeping views over grassy pastures bordered by forest, compared to Aldea Ceiba's maze of paths snaking through garden beds and orchards. These practices, in turn, spark distinct roles or ways of being within the community: as shepherds, gardeners, composters, larvae cultivators, educators, and more.

Soil is of course only one part of the larger story. The figures below (Figures 5 and 6) trace these topical flows through selections from two different recordings of tours offered at both Rancho Bosque and Aldea Ceiba, in which soil was a key component. Each reflects how different species, practices, and ecological systems are invoked while narrating the importance of soil, becoming discursively linked in the process. The connections referenced between particular beings and the waste they create (namely, cows and humans) are fundamentally similar, although they result in distinct fields of praxis. Each narrative also foregrounded certain more-than-others in sketching out broader agricultural systems, explaining each community's approach through the relations between them.

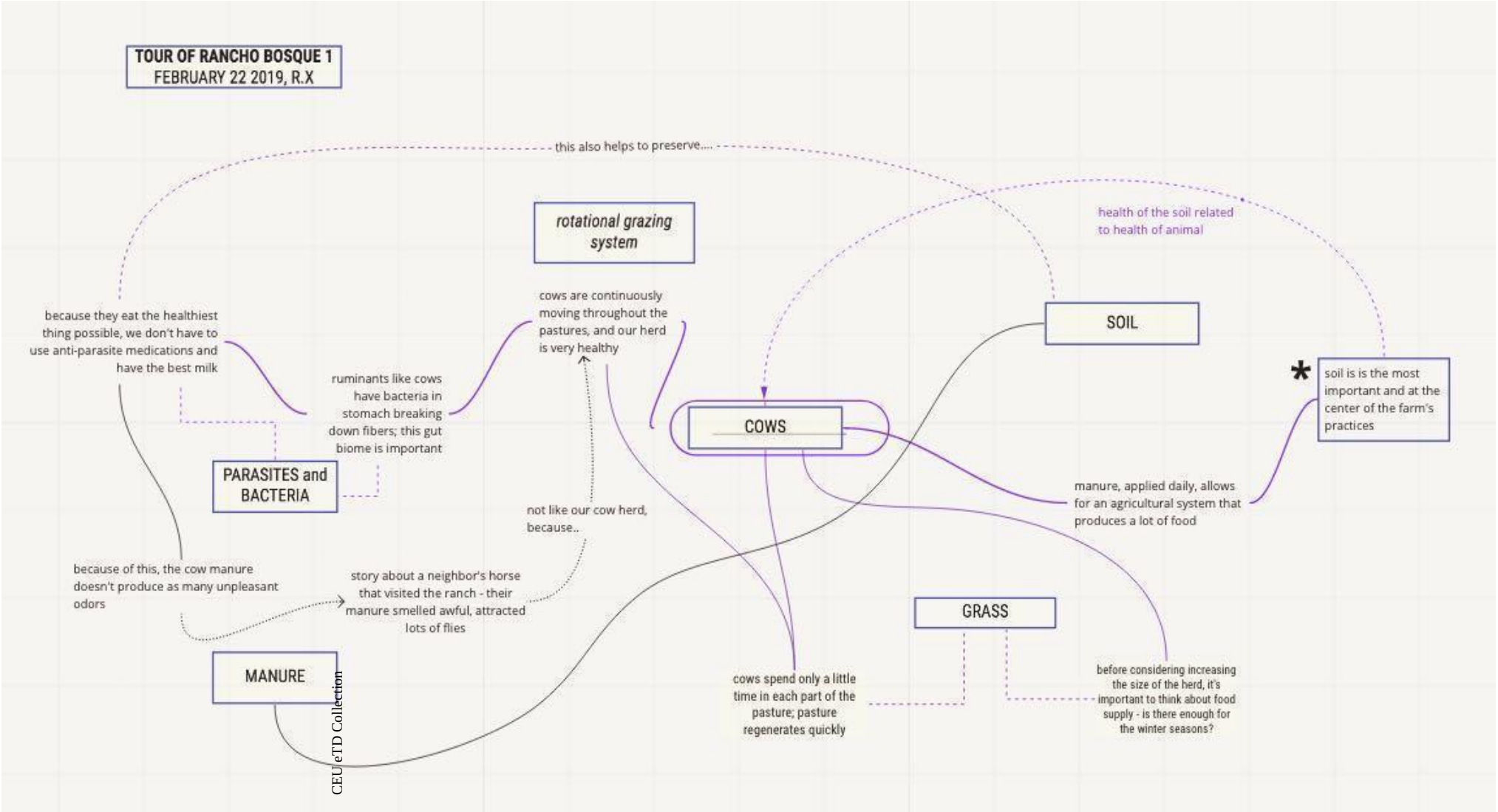


Figure 5."Narrative map" from tour of Rancho Bosque, depicting elements and being invoke

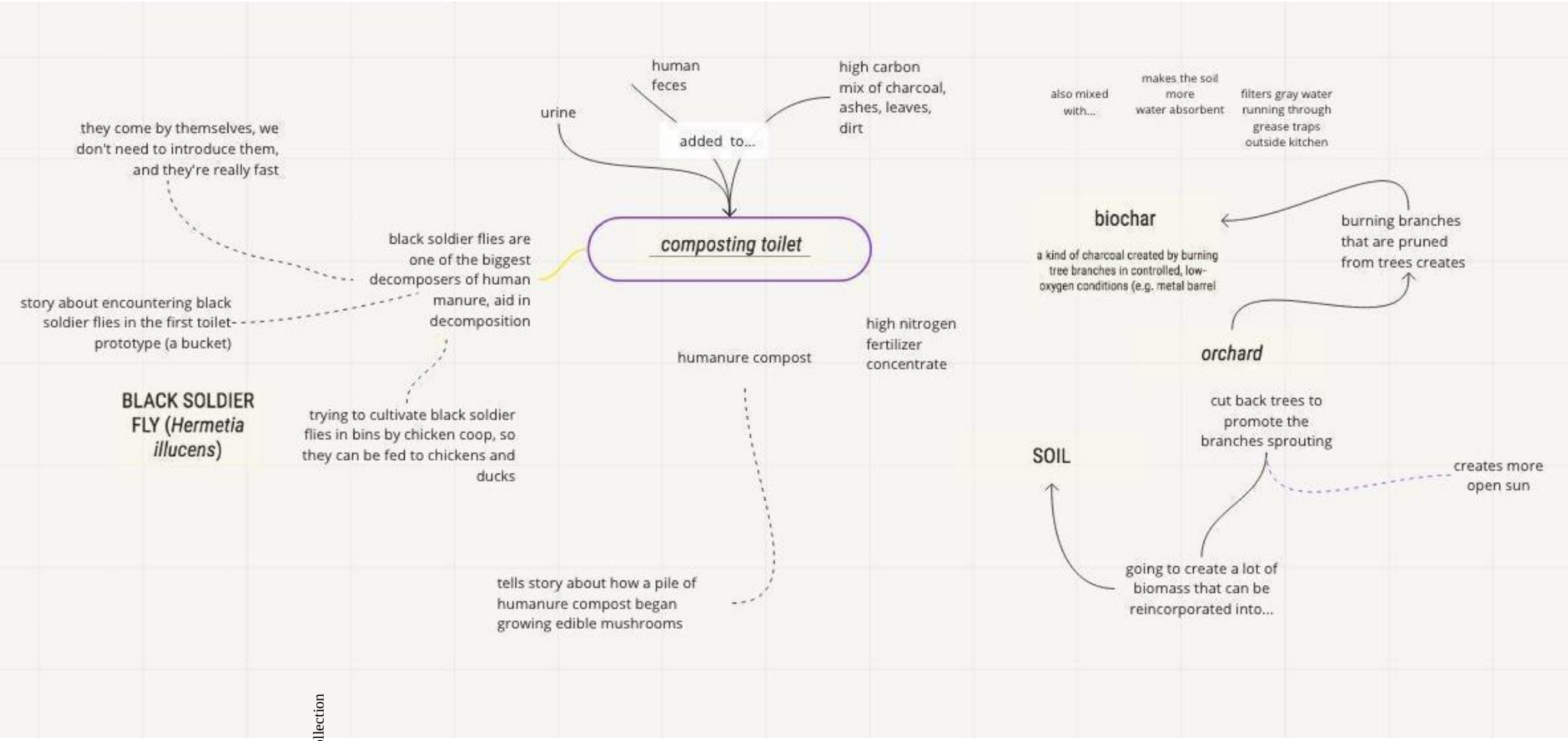


Figure 6. Narrative map" from tour of Aldea Ceiba, depicting elements and being invoked.

Community sustainability narratives become sedimented in place, evident in the ways that residents engage their community landscapes in explaining broader patterns of interspecies connectedness. These imaginaries are embedded in and hinge on relationships with more-than-human others and entities. Although soil serves as a common point of reference for explaining how and why communities engage in practices of regenerating soil, the different ways that communities pursue this goal–including *biochar* production, cultivating livestock, or composting waste–correspond to existing structures and multispecies relationships that characterize each place. With the understanding that these broader narratives hinge on relationships between more-than-human others, in the next section I examine the individual strands that make up these narratives more closely. Drawing on the results from two "multispecies mapping" workshops held in each community, I explore the various ways that residents make sense of and represent ecovillages as places through the use of more-than-human others.

6.4 Multispecies Mapping: Making Sense of Place

Multispecies mapping workshops were carried out in both Rancho Bosque and Aldea Ceiba with the goal of understanding how different individuals in each community understood and represented their community in terms of relationships between and among more-than-human others. Collecting visual representations from individuals, along with a subsequent community dialogue, helped to reveal how each residents' experience of the community space was shaped by their partial and situated relationships with more-than-human others. Each resident represented and centralized beings that they cared for, expectedly, but also revealed the elements of the community that they considered significant for their community.

The workshops were open to permanent residents, visitors, and workers in each community, and were planned in each community at times where the greatest number of

residents who wished to participate were able. Participants were briefly introduced to the research project, and prompted to consider the connections, relationships, and systems that joined together different elements within the community space. Next, participants were asked to represent, using a variety of provided media, their respective communities. This was an open-ended task, and participants were advised to represent whatever elements called their attention most, reflecting on their work or social roles and the individual relationships they maintained within the community. This brief exercise was concluded by a discussion amongst the group of what each individual map represented.

The results of the map-making exercise gesture to the individuated relationships with particular species reflect an individual's participation in the community space, and gestured to their daily work habits, favorite hobbies, personal interests, or expertise. This was reflected by the variety of perspectives and styles of representation that were employed, as indicated in the figures below. Maps often reflect different roles within the community, from working in kitchens, gardens, forests, pastures, or workshops. These are represented in both the scope of individual maps, but also more-than-human inhabitants that they ascribe to community space. One of Aldea Ceiba's primary beekeepers, for example, highlighted the different species of bees on the property and their location relative to one another, notably omitting human spaces (kitchen, tents, communal spaces) as points of reference.

Different residents highlighted distinctive constellations of relationships, centralizing different species or marking the division of space within the community in particular ways. For example, Map A (Figure 7) was one of several maps from Rancho Bosque residents that used *pasto estrella*[170] as a central element, representing the pasture spaces for pigs, cows, goats, sheep, and chickens separately. The layered geometric shapes in the top left-hand corner of the map represented how the farm was composed of different elements that were

[170] This refers to a variety of grass so-called for its “star” shape, and used extensively for livestock forage.

interconnected with one another, explained the map's maker. They continued by pointing out the drawn "A"s stood for "*animales*" (animals), the components that were the most important part ("the top of the pyramid") according to the participant (a shepherd who worked daily in the pastures).

The maps that individuals created also revealed how they understood their role, as humans, within these broader constellations of more-than-human relationships. Maps tended to highlight the relationships that residents were most familiar with in their daily work, and mirrored other kinds of narrative and physical distinctions between community areas. Two maps from Rancho Bosque used contrasting colors (gray and green) or styles of line (wavy and organic vs. rectilinear) to draw attention to the artists' conceptual divisions between "workspaces" and "natural spaces" (see Maps B and D [Figures 8 and 10]). For example, the creator of Map D (Figure 10) worked largely in the *quesería* (community dairy operation) making products with milk produced by the community's cows. The artist explained to the other residents that the space filled with squares in the corner represented the dairy kitchen, where they spent a large portion of the day heating milk and pressing cheeses. The wavy-lined mountain surrounded by ferns, she pointed out, represented the cave at the top of the hill where she went to place cheeses for curing–an occasional but beloved task. These divisions mark both spatial and conceptual boundaries, and are uniquely inflected by the artist's roles in the community and the ways they relate to spaces within it. While some broad thematic similarities were evident within the group–for example, the centrality of animals to the agroecosystems of the community–each of these ways of making sense of space were also deeply subjective and individualistic.

Just as soil was used as an entity to explain and narrate relationships between other kinds of more-than-human others in the community, other species or entities emerged as key subjects in residents' maps that allowed them to narrate their situated understandings of

ecological relationships. One young apprentice took up most of his page with an illustration of a bee, surrounded by flowers and small bugs–the parasites that lived in their hives, he explained.[171] His map didn't represent his day-to-day roles on the ranch, but rather represented a newfound interest in learning about beekeeping as well as an emphasis on the importance of bees as crop and tree pollinators. In one instance, a young man named Francisco carefully traced an emoji from his smartphone, a tongue-in-cheek reference to animal manure–what this resident explained as the "major force" of the community (Figure 9, Map C). The bottom half of the page is divided by a line made from glued-on grass, representing the equal division between the worlds above and below ground. Although there are (notably) no animals represented here, their presence is suggested by their personified, gleeful waste. The relationship between the animal (waste) and the tunneling worms is a mutually enriching one, the resident explained: "that's why the worms are smiling."[172]

In describing their maps, or in discussing the maps of others, residents used references to particular more-than-human others to represent their role in the community in the context of broader systemic flows. Francisco described his "manure map," for example, by explaining how his work caring for livestock was implicated in the construction of soil fertility: "I work with all the animals, and well, to take care of animals is to take care of the grass (*pasto*), so that there's enough animals so that there's enough manure, so that there's enough worms, so that there's enough grass, so that there's enough animals, so that there's..." he trailed off, tracing a circle with one of his hands.

Maps were also imagined as artifacts that might be useful for key more-than-human actors. Maps F (Figure 12) and G (Figure 13) were drawn by two different residents of the same community, both illustrating "the chicken coop world" (or "*el mundo gallinero*," as one

[171] Not pictured.
[172] Field Notes, Mapping Workshop, February 2, 2019

map was titled). Both maps reflect each residents' own experiences in the community–for example, the artist of Map G explained that their map represented the paths that chickens would commonly take when let out of the enclosed pen adjacent to their covered roost. Though the intent was to let chickens into the fledgling food forest where medium-sized coconut and papaya trees had been established (indicated by the arrow on the bottom-right), so that they might be able to harvest the insects that fed on them. The title of the map, "*gallinas vs. huerto*" (chickens vs. garden), paints a more complicated picture. Corralling the chickens towards the areas where pest-control was needed and desired and away from the areas that chickens wanted to go was not an easy task, requiring supervision (and later, the construction of chicken-high fences) to prevent them from eating the young seedlings sprouting in the garden areas.[173]

[173] This was indicated by the points of each of the other arrows on the map.

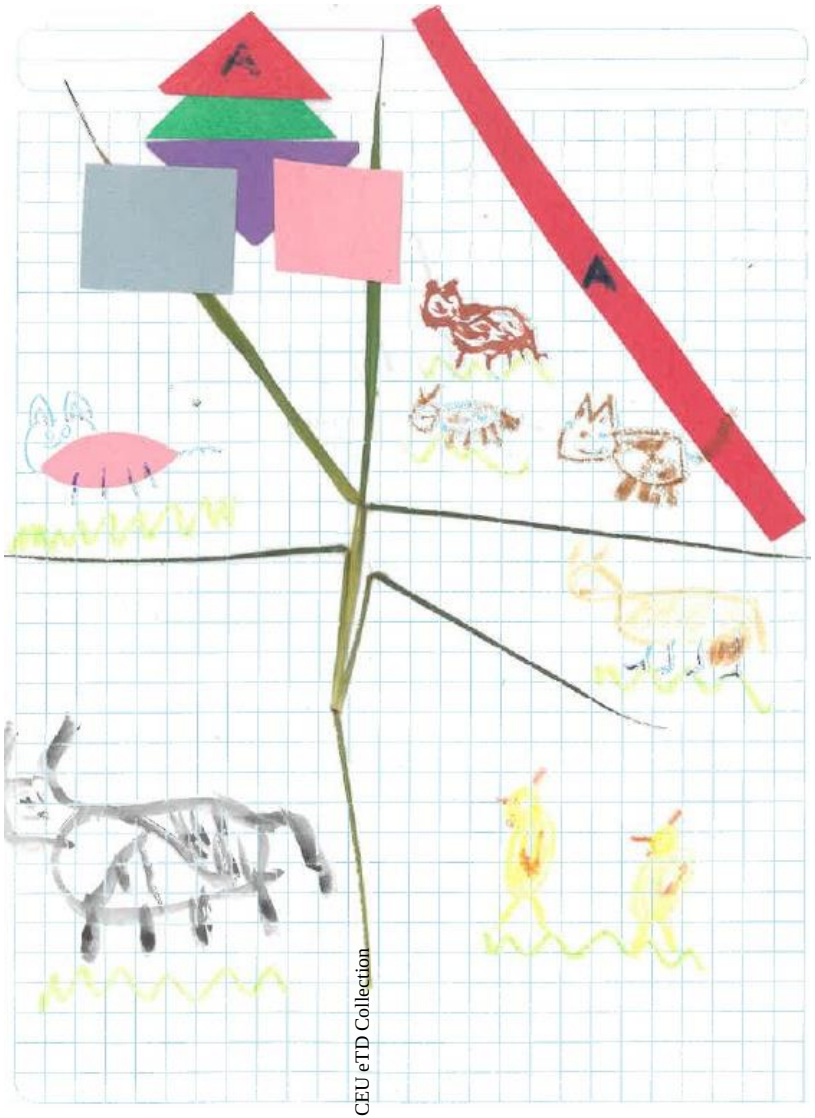


Figure 7. Map A, Rancho Bosque.

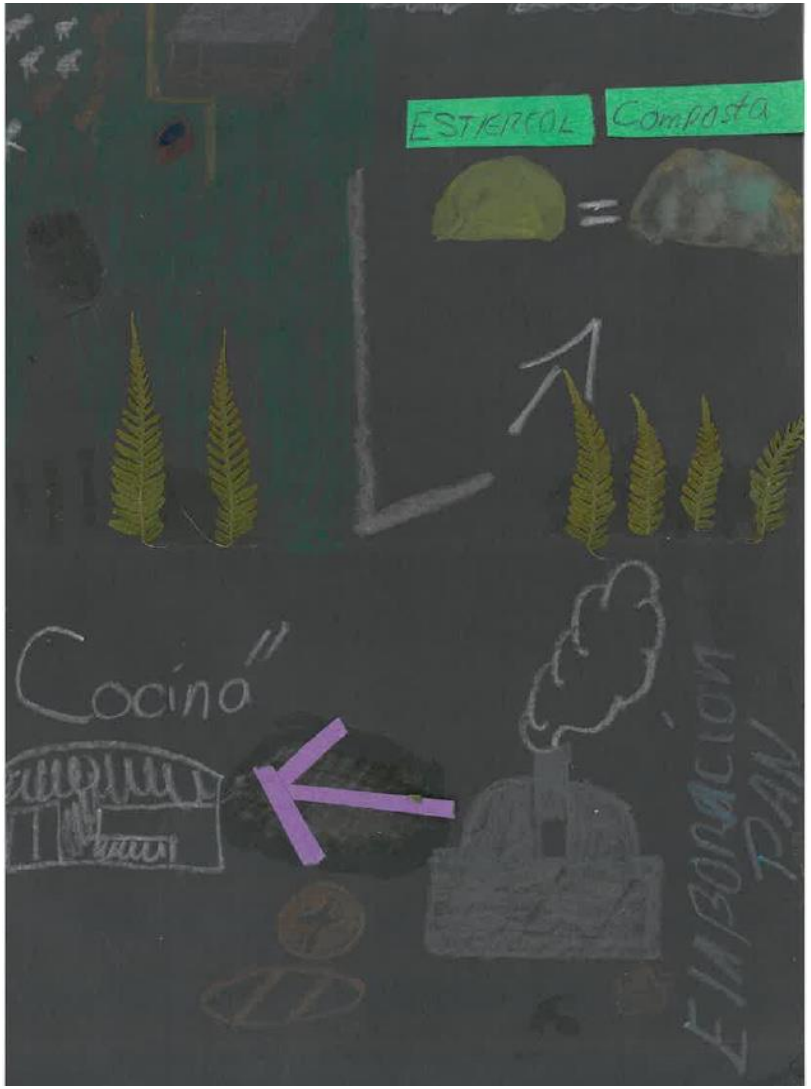


Figure 8. Map B, Rancho Bosque.

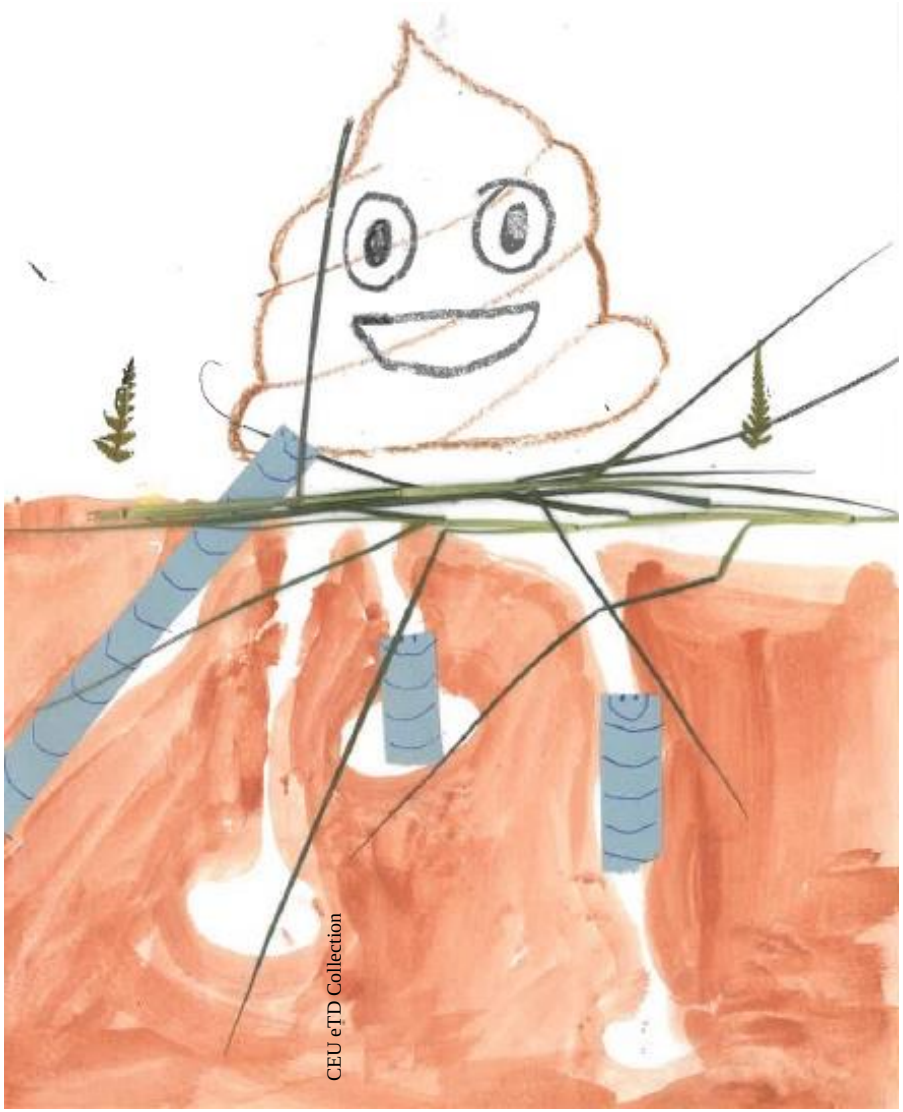


Figure 9. Map C, Rancho Bosque

Figure 10. Map D, Rancho Bosque.

Map F, on the other hand, illustrates how the chickens' world–the coop itself–is inhabited and experienced by an array of different species. As the author of Map F described:

> It's a place where other beings–not only chickens–live. There are many other animals and people that live there that have different interests. So, this is a map of everything that lives around. There is the house of the iguana, and the bees. And the house of Gonzalo... there's chickens, the little duck, the turkey, and other birds [*pájaros*] that don't *actually* live in the *gallinero* [group laughs]... they're snakes, the cats, and dogs, and other animals that want to eat the chickens.[174]

The artist explained that the lines were represented "curvy" because, though these were not the "actual" paths of the different animals, to represent their agency in a way that could show how "they could move about freely" in the space: "With the colors, I wanted to represent different interests–some go to the *gallinero* for food, water, or just because they like it." The artist also explained how not all of these movements were the same–that chickens "had no choice" to live in the *gallinero*, but other species could come and go more freely.[175]

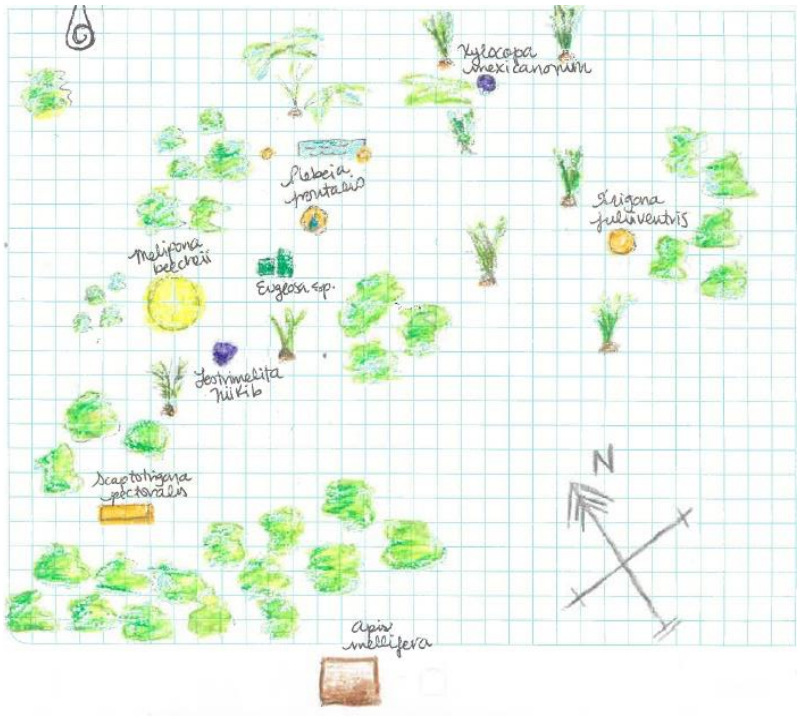
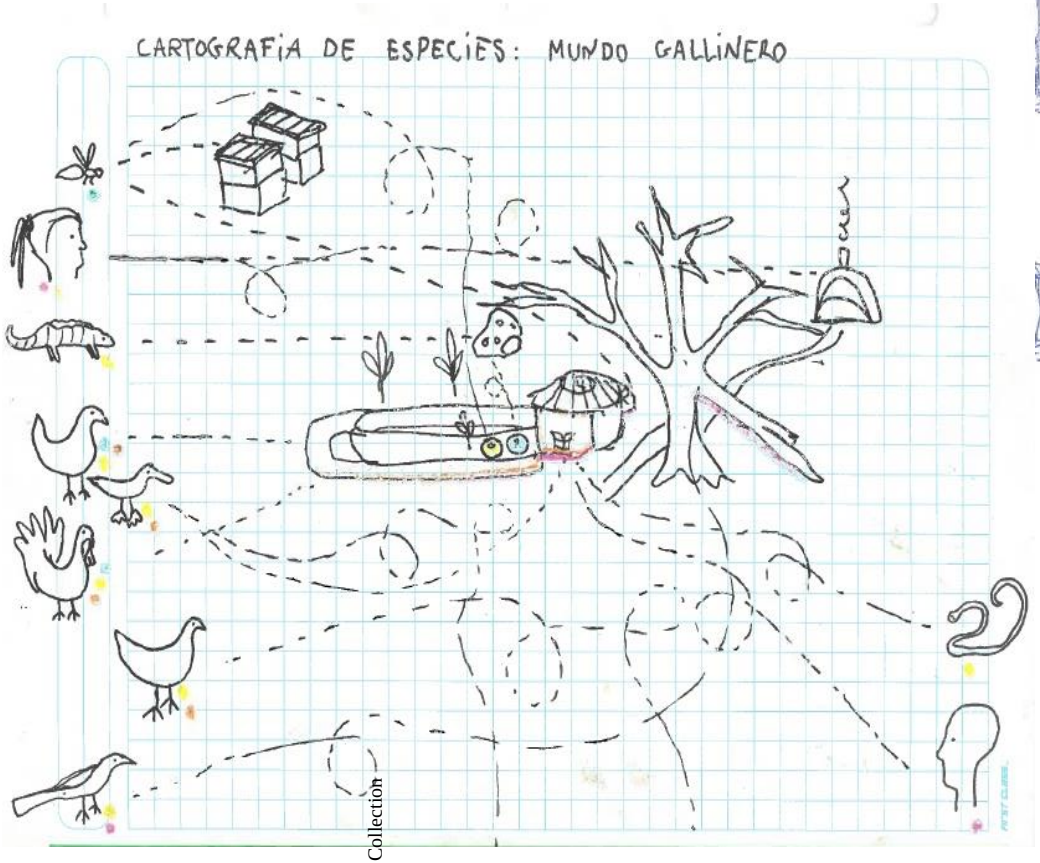


Figure 11. Map E, Aldea Ceiba

[174] Field Notes and recording of workshop, April 11, 2019
[175] *Ibid.*



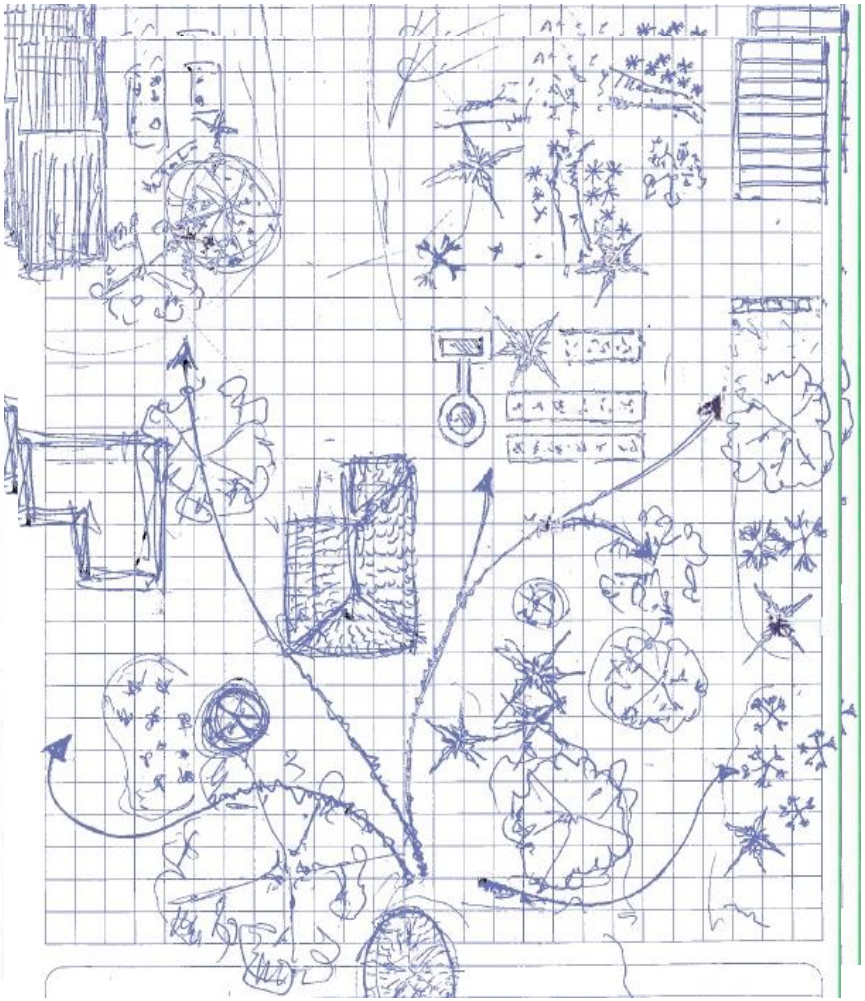


Figure 12 [left]. Map F, Aldea Ceiba, **Figure 13 [right].** Map G, Aldea Ceiba

Finally, maps illustrated attention to the individual movements and territories of other beings, both cultivated and uncultivated. Map E (Figure 12), for example, represented the locations of the different bee species present in the community. The artist made a conscious choice, they explained, not to represent the different buildings of the community, marking different "families" of bees with different colors–orange for *Trigona*, yellow for *Melipona*, and purple for two species of bees that, although not members of the same taxonomic group, exhibit similar behaviors–"robbing."[176] Another workshop participant, a community resident who organized birdwatching groups for children in the local community, used their map[177] to reflect on the ways in which birds moved through different areas of the community. As they presented their map to the assembled group, they explained:

> The little yellow one here is the *chipe encapuchado* [*Setophaga citrina*], that you only see over here by the bathroom, and here, across from the workshop. And sometimes on this side of the kitchen. But I don't know why they only seem to come over here. I don't know...Also, I realized… "el pich," *Dives dives*,[178] normally it's in the *gallinero* a lot because they go for the food of the chickens, and the water. But they're the only ones that go around all parts…the seedling house, they come here to the parking area to fight with their reflections in the mirror of the car, the bathroom... also, the Euphonias...I only see them here, in front of the workshop in the garden, and sometimes they go to the *torre del luz* (solar panel tower), but not in other parts.[179]

They explained that while initially they only observed the birds in the forest, that over time they had come to expect birds in different areas, presumably the territories that they defend for themselves and where they found food. While the participant acknowledged that the map only showed a small fraction of the birds around the community space, the exercise hinted at the alternate time scales of other beings as they moved through the area. "There are birds that

[176] *Xylocopa mexicanorum*, a kind of carpenter bee, "robs" flowers of their nectar by cutting small holes in the base of the flowers. *Lestrimelitta niitkib* (also known as "Limon kaab" in Maya because of their lemony smell) do not collect their own pollen or produce their own honey, but rather steal them from other bee colonies that do.
[177] Not pictured.
[178] Full species name was included in recorded dialogue.
[179] Multispecies Mapping Workshop [audio], April 11, 2019.

only and always make the same routes–for example, *las aguilillas* (birds of prey) go out almost at the same time every day, at about nine in the morning, they pass by here" they explained, tracing a line across the right side of their map in an arc.

The results of the mapmaking workshop reveal that although different communities share ostensible similarities that afford them a common "ecovillage" label, the ways that individual residents interact and reckon with their communities as more-than-human places are highly individuated. Zooming back out from each individual map and taking stock of each of the elements represented yields a patchwork view of each community, which when taken together represents the diverse perspectives and fields of relationships that are involved in shaping community life. These multiple, partial understandings of ecovillage space through particular relationships with others are at play in the broader knowledge politics specific to each community, and shaped into coherent sustainability narratives through everyday social processes of living, working, and solving problems together as a community.

6.5 Conclusion

Back in the garden of the *algodones*, Pierre introduced the space to me by pointing out different individual plants, noting where they came from and what special attention they might require. He noted the lone coconut tree ("the guys brought it here from Las Palmas"),[180]remarking that ever since its transplantation to this garden area, it hadn't been doing so well. He also pointed out the neem plant, which I recognized from my initial visit to the community the year before–the neem plant had formed the center of a plant "mandala" planted in different garden areas outside the workshop and had been surrounded by medicinal plants. "It was doing well there, but a lot of people told us we shouldn't put it there," he said. When asked to explain, he offered that "neem can apparently kind of take over and gives off

[180]*Las Palmeras* was the name given to one of the cenotes on the property, so-called because of the large number of coconut trees growing near a sinkhole.

too much shade–so that's why we decided to move it back here in the first place. But ever since we did that, the ants have totally destroyed it–it's basically dead, but I think I might be able to bring it back."[181]

Upon mentioning ants, the work of the insects throughout the garden became visible. Pierre began to point out other areas where the ants had eaten away at roots and killed certain plants, while others seemed untouched. The reference to ants brought us into the realm of other kinds of activity and cultivation that occurred without human direction. He pointed out two small lime shrubs, planted on opposite sides of the path. "The ants are totally destroying these citrus plants too. They take the leaves of one, then move to another. When the leaves of the first one grow back, they switch back," harvesting and letting regrow in succession. Pierre pointed out that leafcutter ants did not really "eat" the leaves themselves, but instead used them to cultivate a fungus on which they fed instead. I looked down at the hose that I had dragged along behind me to douse the young trees as I went, and wondered about the boundaries of the garden space that the community had claimed from the undergrowth of the new jungle as theirs. How did Pierre, and his plans for cultivating limes, factor into the ant farmers' plans and cultivation strategies? In watering the lime trees, were we working to maintain our own agroecosystems–or someone (or some-body) else's?

In the previous sections, I have traced some of the ways that ecovillage residents connect knowledge to place in the context of their communities in a process of coherence-making: wedding the conceptual to the material. What emerged from both participant observation and group workshops was that ecovillage residents use more-than-human others to synthesize and describe their community in systematic ways. These narratives were formed at both the collective and the individual level. While certain entities (like soil) serve as collective touchpoints for ecovillage residents to understand the multispecies relationships

[181] Field Notes, April 14, 2019.

that undergird each community, the way it is valued, utilized, and managed differs substantially. These differences further challenge the notion of sustainable soil management is a concrete goal that can be achieved through multiple ways–instead, stories about soil and sustainability shift in relation to practice.

These community meta-narratives are also couched in the individual experiences that residents have of a place and the more-than-human others they encounter. At the same time, there are limits to the knowability of more-than-human entanglements, a fact of which some ecovillage residents are well aware. In the next chapter, I follow the thread developed in the last section of this chapter on more-than-human forms of coherence-making, or the ways in which more-than-human others are implicated in the stitching together of knowledge and practice in place. To do so, I focus on bee species cultivated and cared for by the community of Aldea Ceiba.

Chapter 7. Caring in Order to Care: Bees of Aldea Ceiba

The landscape of central Yucatán, home to the community of Aldea Ceiba, is a global biodiversity hotspot, especially for insects: the 3000 insect species currently documented are estimated to be only a small part of the total number from the region, and include over 190 species of wasps and bees alone.[182] Residents of the Aldea Ceiba community take care to point out the homes of native bees when they are encountered on their land, hand painting signs with their scientific and common names and displaying them next to the hives' location–sometimes in a dead tree trunk or in the ground, others in hive boxes located in common spaces like the kitchen. One of the community's residents tells me that they have no less than seven species of bees in the area surrounding the common living spaces, both cultivated and wild (Figure 14), and this number continues to grow: "as we learn more about the land, we keep discovering them everywhere."[183]

Image 14. Sign calling attention to a native beehive in a tree, Aldea Ceiba.

[182] these insects fall under the Apoidea family (see León-Cortés 2015).
[183] Interview, Patricia, June 29, 2019.

Image 15. A young duckling surveys the hives of the solitary bee *Euglossini sp.*, housed near Aldea Ceiba's kitchen and dining area.

Figure 14. Bee Species Identified in Aldea Ceiba Community

Scientific Name	**Common Name (Language)**[184]
Apis mellifera	abeja or abeja americana (Spanish); European honeybee
Euglossa sp.	abeja orquídea (Spanish), orchid bee
Lestrimellita niitkiib	Limón kaab (Maya)
Melipona beecheii	Xunan kaab, Ko'olel kab (Yucatec Maya)
Plebeia frontalis	Aj chi', Ak chip kap (Lacandon Maya)
Scaptotrigona pectoralis	Ak tun kap' (Lacandon Maya)
Trigona fulviventris	mu kap (Yucatec Maya)
Xylocopa mexicanorum	abeja carpintera (Spanish), Mexican carpenter bee

[184] Lacandon translations adapted from Contreras Cortés et al. (2020).

In the chapter that follows, I focus on two species of bees actively cultivated in the community of Aldea Ceiba: *Apis mellifera*, commonly known as the European honeybee, and *Melipona beecheii* (or *Xunáan kab* or *Ko'olel kab* in Maya),[185] a stingless, honey-producing bee native to the Yucatán peninsula. Both *Melipona beecheii* and *Apis mellifera* are considered "eusocial" insects due to several characteristics: individuals work collaboratively to rear the young of the entire colony, there is a marked division of labor, and colonies comprise multiple, overlapping generations (Bąk-Badowska et al. 2019). But other differences between the species–the ways that they build their hives, reproduce, and produce and store their food–influence how humans cultivate and care for them. These differences, in turn, require drawing on different kinds of knowledge from various sources, pertaining to not only the practical work of inspecting or managing hives, but also for developing a broader understandings of how different bee species interact with trees, flowering shrubs, pests, and other bees in the landscape. In this respect, the process by which Aldea Ceiba residents came to know about the Yucatan environment was inflected by their care for *Melipona* bees, which necessitated attunement with particular beings and ecological relationships.

These distinct fields of bee sociality have material consequences for the ways that Aldea Ceiba residents integrate the cultivation of bee species into broader community sustainability projects. Like other bee species native to the Yucatán, *Melipona beecheii* have co-evolved with other endemic plant species in specific ways that introduced species have not, resulting in intimate relationalities that are particularly vulnerable to ecological disturbance or landscape change. In contrast, *Apis mellifera* are exemplary generalists, in the sense that they are not dependent on any particular kind of flowering plant for pollination. As wild populations of *Melipona beecheii* have declined in recent years, the proliferation of *Apis*

[185] While these names are interchangeable, *Xunáan kab* is heard more commonly. Both names mean "honey goddess" (Toledo and Barrera-Bassols 2017) or "lady of the honey" (Schlesinger 2002, Pat et al. 2018).

mellifera hives along with increasing deforestation have been framed as threats to *meliponicultura*, the traditional practices of caring of *Melipona* bees (Villanueva-Gutiérrez et al. 2005; Villanueva-Gutiérrez et al. 2015). Each bee's behavior implicates them in distinctive patterns of relationships with plants, pests, and other insects (including other bees). The residents of Aldea Ceiba themselves become entangled in these multispecies relationships, obligated to account for more-than-human (and more-than-bee) others in their cultivation of different bee species. Tracing these processes helps to explain how sustainability narratives nominally framed in relation to particular more-than-human others (one, or a handful), gradually become more complex multispecies projects through practices of care.

Each bee species might be seen to belong to distinct sustainability narratives that, on the surface, seem incommensurate with one another. *Apis* bees are often understood as a highly "productive" bee[186]; as a result, the care of *Apis* bees has often been promoted as a tool for sustainable rural development (including, as I discuss below, in Yucatán). In contrast, caring for *Melipona* bees requires an in-depth understanding of the flora and fauna of Yucatán (both wild and introduced) to develop patterns of locally specific care and management. To this end, it is not possible to engage with *meliponicultura* without consulting with traditional practitioners and indigenous expertise. In Mexico, where indigenous communities and biodiversity are discursively linked within environmentalist and social justice movements (in part due to shared cultural narratives of loss, resistance, and survival),[187] caring for *Melipona* bees allows communities and projects like Aldea Ceiba to frame themselves as accomplishing both social and ecological dimensions of sustainability.

[186] It is important to note that understanding "productivity" or "usefulness" are constructs that tend to refer to the ease with which a species adapts themselves to human needs. A healthy colony with sufficient foraging access will always provision themselves with the necessary amount of pollen, nectar, and honey which it needs to survive. Therefore, understanding *Apis mellifera* as a more "productive" species emphasizes their propensity to produce a surplus.

[187] See discussion in Introduction.

While care for *Apis* bees articulates to a more "global" sustainability narrative, caring for *Melipona* bees requires developing localized, place-based understandings.

Although *Apis mellifera* and *Melipona beecheii* have been framed as ecological competitors (Roubik 1978; Cairns et al. 2005; Pinkus-Rendon et al. 2005), both species have come to be seen as important components of the socioecological system as envisioned and practiced by the community of Aldea Ceiba. While both bees are cultivated by the community for the same ostensible reason–to harvest honey for consumption or sale–important biological and social differences between these kinds of bees necessitate different ways of working with and caring for them, practices that emerge through embodied encounters with hives as centers of interspecies relationships. Here, I explore this apparent contradiction of caring for two species with competing needs by exploring how divergent sustainability narratives collide and are made coherent through practice. I do this by tracing the relationships in which each bee is and has been entangled: both with other species in and around the community of Aldea Ceiba, as well as with one another.

This exploration of bee sociality shows how more-than-human coherence-making is implicated in shifting ecovillage sustainability narratives. By more-than-human coherence-making, I refer to the ways that more-than-human others act within and articulate to other beings within certain socioecological systems. As I discuss in chapter 2, more-than-human others are continuously involved in processes of co-evolution and niche construction, processes which when taken together describe broader processes of ecological change. In the sections below, I ask how both *Melipona beecheii* and *Apis mellifera* are implicated in (and challenge) how ecovillage residents construct coherent socioecological systems, but also how they themselves create ecovillage communities.

Following these threads reveals the ways that bee stories are also human stories. In other words, the ways that each bee engages in coherence-making is influenced by (and in

some ways contingent on) the ways that landscapes have been altered or by the ways that bees have been "put to work" by humans. Throughout this chapter, I highlight the ways that Aldea Ceiba residents care differently for each kind of bee, pointing out how these care practices are implicated in residents' attempts to make sense of their community as a self-sustaining, multispecies assemblage–and further, how they use their work with different species to accomplish this. I develop an understanding of how ecovillage residents conceptualize and practice care for one species (*Apis mellifera*) as a way of practicing care for another (*Melipona beecheii*). Through this process of "caring in order to care," ecovillage residents negotiate conflicting allegiances to different species, drawing them into coherent narratives of harmonious conviviality.

7.1 Learning to Care: The Bees of Aldea Ceiba

When you arrive at "the land" ("*el terreno*"), the portion of the Aldea Ceiba community located in the forest where most Aldea Ceiba residents live and work, one the first signs you encounter is one directing you to the *meliponario*, the area where Melipona bees are kept and cared for. Though I had passed by the structure often, just behind the kitchen and dining room area, I had mistakenly assumed that the area was not yet in use. Having worked with European honeybees before, I knew that the distinctive humming of bees could often be heard before any bee activity could be seen. In contrast, the six small wooden boxes, raised on a shelf anchored by concrete blocks placed on the floor, were relatively silent. The plant cuttings placed in glass jars, artsy photographs of native bees hanging from the ceiling, and the whimsical painted bench in the corner resembled a meditation platform, not necessarily a workspace (Image 16). When I mentioned to Patricia that I was interested in *Melipona beecheii*, she lit up. "Would you like to see them?" she asked, and called me over to the shady platform. "Don't we need to get suits or some

equipment first?" I asked, nervously recalling some painful past encounters. "No, we don't need anything to protect us," she told me: "they don't have stingers, anyway."[188] This was the first time I was inducted into the world of stingless bees.

Even for an experienced beekeeper, learning to care for *Melipona* bees requires fresh eyes to discern the functional and affective differences of *Melipona* hives compared to other kinds of bees. The interior of a *Melipona beecheii* hive resembles a small, organically planned village, quite unlike the uniform frames of hexagonal cells that are often associated with the practice of beekeeping (Image 17). The entrance of the hive is a small, tapered channel, blocked off by a guardian bee (*báalam kaab* in Maya[189]) that waits to identify and admit colony members returning to the hive from foraging missions. Different structures within the hive allow for easy identification of what is stored there–larvae are stored in capped, rounded cells, arranged in pyramidal layers separated by small pillars of cerumen,[190] while pollen and honey are stored in small uncapped "pots," grouped in large masses nearby. There are even "garbage dumps" towards the edge of the box, where dead bees or old wax will be collected. These structures are cordoned off by walls of wax, created either by the bees themselves or reproduced by a savvy beekeeper, to prevent the intrusion of harmful parasites.[191]

Learning to navigate the interior world of all hives requires practice and attentiveness, but the greater visibility of *Apis mellifera* relative to *Melipona beecheii* in the broader practice of beekeeping hindered residents' attempts to learn more about native bee species and their care. Besides personal connections to other *meliponicultores* (traditional *Melipona* keepers), Gonzalo and Patricia had fewer resources to learn about bee biology and behavior

[188] Field Notes, June 14, 2019.
[189] Personal Communication, October 21, 2019.
[190] Anecdotally, several have suggested that this unique shape inspired Mayan pyramid construction (Field Notes, Beekeeping Workshop, March 29, 2019).
[191] See Roubik (2005) for further details of intrahive dynamics.

of *Melipona*; indeed, their primary source for issues that arose was a local practitioner for whom Patricia had contracted as a mentor. In contrast, Gonzalo, another of the community's head beekeepers, came from a family of beekeepers near Mexico City, and could readily find information on *Apis* care online and in books and documents in the community's library.

Image 16. *Melipona* hives on a raised platform in the *meliponario*.

Image 17. Interior of *Melipona beecheii* hive.

Gonzalo also worked closely with a Maya man from the nearby community who came to work in the community regularly and had his own *Apis* hives in town. While validating processes and approaches for effective care for *Apis mellifera* was relatively easier, much of what Patricia and Gonzalo had learned about *Melipona* had come from external collaborations and their own trial-and-error.

Since the founding of Aldea Ceiba, the keeping of bees has become an activity of central importance. *Apis mellifera* honey is a staple at the breakfast table, and is also occasionally used to prepare alcoholic beverages for recreational consumption. *Melipona* honey, on the other hand, is reserved for medicinal applications–several residents have eyedropper-sized bottles of their own in case of scratches, sore throats, or eye problems.[192] The sale of honey also brings in a modest, but important, source of cash income for

[192] This honey can also be applied directly to the eyes–although it causes a burning sensation, locals have reported that such applications can treat infections of the eye, and has anecdotally been known to improve vision at night (Field Notes, March 30, 2019).

community residents. During my first visits to Aldea Ceiba, the honey of *Apis mellifera* was being sold and marketed within networks of friends in Mexico City, and was also available to visitors to take home. Over time, these offerings grew to include *Melipona* honey as well, and a small shop was constructed where both kinds of honey were marketed to visitors, workshop attendees, and volunteers.

Knowledge about bees can also be profitable, and residents leverage cultural interest in native bee species to reap benefits from the care of *Melipona* in ways that did not involve scaling up production of and extracting honey. In March of 2019, I took part in a multi-day residential workshop that focused on the basics of apiculture at Aldea Ceiba, with a focus on both kinds of bees–the first of its kind held by the community. The workshop was intended to bring in a new source of income by charging visitors and interested guests who wanted to learn more about the particulars of beekeeping, including strategies for keeping both *Apis* and *Melipona* bees, in the Yucatán environment. On the first day of the workshop, the head beekeeper joked with us, "when we decided to do this event, we told a beekeeper friend who said, 'whatever you do, don't put native bees in your workshop–no one will come!"[193] Apparently this wasn't the case–workshop attendees included those from the nearby urban center of Merida, a traveler from Germany, and a couple from Queretaro, all with an intense curiosity about the care of the *Melipona* bee, even if it was not possible to cultivate the species in their home environments.

Caring for bees is not only a matter of executing a particular protocol of tasks, but of learning to sense and to improvise when responding to the state of each hive (Moore and Kosut, 2013; Davies and Riach, 2019). As Moore and Kosut (2013) describe, doing a hive inspection not only involves visual observation, but is also an embodied practice of "smelling, hearing, tasting and feeling them through your own body" (92). Certain cues–the

[193] Field Notes, March 29, 2019.

sudden construction of wax cells, the color of wax, or the presence of other insects–can help the beekeeper understand the state of the hive and develop a plan for intervention. This act of paying close attention to the activity of a beehive can be a meditative experience, perhaps evoking a sense that there are "complex and mysteriously unknown worlds" that intersect with our own (Taylor and Pacini-Ketchabaw 2015, 521). The habit of keeping bees also can be a deeply emotional experience. For one beekeeper, the smells and sensation of working with bees fills him with "nostalgic joy" and reminds him of his youth–as he tells it, "I remember when I was a child seeing the smoke, the bee boxes, the centrifuge...the passion that my uncles and my cousins had for them."[194] In this sense, beekeeping is a multidimensional practice that not only involves particular forms of practical knowledge, but also the emotional work of caring for other beings (see also Bratman 2020).

The workshop emphasized the stark differences between *Melipona beecheii* and *Apis mellifera*: in terms of their biology and ecological relationships, but also the qualitative differences in their respective patterns of care. When Patricia opens the lid of one of Aldea Ceiba's hives, she describes how they are a "calm" bee–instead of swarming or stinging us, they serenely resumed crawling over the small pyramids of wax.[195] *Melipona beecheii* are part of a broader family known as "stingless" bees, and as such do not defend themselves with toxins delivered by stingers. The absence of this appendage makes it possible to observe, handle, and work with *Melipona beecheii* without protective gear. Working with *Apis mellifera* is a different matter altogether: they can be particularly aggressive,[196] and will confront intruders with painful stings that inevitably kill the attacking bee. "Smokers" (tools

[194] Interview with Gonzalo, April 23, 2019.
[195] Field Notes, June 12, 2018.
[196] This aggression has only grown in recent years as colonies have hybridized with feral colonies of African honeybees, which are reported to be extremely aggressive to both humans as well as other bees. African bees were introduced in Brazil in 1956; they were subsequently released by accident, gradually migrated northward, and established feral populations that mixed with populations that had already been introduced. The first Africanized colonies of *Apis mellifera* were noted in Yucatán in 1987 (Quezada-Euán 2007).

that use a bellows device to produce and deliver targeted blasts of smoke) are also used regularly during hive inspections, as smoke masks alarm pheromones given off by bees and allows beekeepers to "calm" the bees as they work in harvesting or in hive inspections. In preparation for observing the *Apis mellifera* hives on the second morning of the workshop, Patricia and Gonzalo helped participants into makeshift "bee suits," consisting of rain jackets, sweaters, long underwear, and heavy socks paired with wide-brimmed hats and veils. It was important to cover every piece of exposed skin before approaching the *Apis* hives, Patricia explained, which were located strategically far away from the living spaces of the community. "If one bee finds their way in, it's like a signal to the rest of the hive and they will follow," she explained. Despite our precautions, an unlucky resident was stung directly on the nose as he adjusted his hat, some two hundred meters away from the hives.

Biological differences between *Melipona beecheii* and *Apis mellifera* became important for how residents framed the value of each species, which in turn influenced their care practices. For instance, both species were often compared by the community's beekeepers in terms of "productivity," and relative ease of harvesting honey and other products of the hive.[197] Speaking about his experience with bees, one beekeeper expresses his admiration for *Apis mellifera* as a model "worker being": "they're super productive, they really hold fast to their work."[198] An average colony of *Apis mellifera* produces nearly 32 kg of honey per year, compared to about 2 kg produced by an average *Melipona beecheii* colony (Echazaretta et al. 1997).[199] In addition to the amount of honey produced over time, the way that each bee constructs their hives has an impact on the relative ease of collecting honey and other products. *Melipona* bees store honey in small wax pots–these pots can be cut out of the hive carefully and filtered, but this is usually avoided as it takes a much longer time for

[198] Interview with Gonzalo, April 23, 2019.
[199]Pat et al. (2018) note that 1 liter of *Melipona* honey is approximately 1.25kg. They also place the upward range of *Melipona beecheii* production slightly higher, at .5-2.5 liters per year (approximately 0.6–3.1 kg).

colonies to rebuild them. As a result, beekeepers in Aldea Ceiba harvest *Melipona* honey much more carefully, using open-ended syringes to extract honey without damaging the wax pots where they are stored. In contrast, *Apis mellifera* are normally cultivated using a Langstroth hive, a series of stacked, hollow boxes with frames that bees fill with honey, pollen, and larvae. Frames filled with honey can be removed easily and run through extractor machines that separate the honey from the wax cells through centrifugal force. Because of these factors, *Apis* colonies are considered more amenable to developing economies of scale.

Unsurprisingly, this difference in productivity influences how each bee's honey is valued in wider markets. Prices of honey of *Apis mellifera* honey vary widely, depending on whether they are from one floral source (such as from the *jabim*[200] or *dzidzilche* trees, which are more highly prized), or mixed together from multiple sources. However, one liter of *Apis mellifera* honey (*miel de abeja*) is sold for between $15 and $30 MXN per liter (around 1 EUR). In contrast, one liter of *Melipona beecheii* honey might sell for $1000 pesos per liter (around 45 EUR), and often much more (López de Haro and Vargas-Hernández, 2020). The higher price of *Melipona* honey is a function of both the time it takes to produce such a high quantity, as well as its relative rarity since production has drastically decreased. While *Melipona beecheii* honey has become more well-known in recent years for its medicinal value and interest in the product is increasing locally (de Oliveira Alves 2013), it is currently not possible to export honey on an international scale. This is in part because export standards are developed with *Apis mellifera* honey in mind; *Melipona beecheii* honey is more "liquid" and contains a lower humidity content, and therefore does not meet standards for commercialization outside of Mexico. As a result,

Melipona beecheii are somewhat elusive, and in the day-to-day life of ecovillage

[200] Alternatively spelled "jabín," *Piscidia piscipula* is regarded as a high-quality material for construction because of its hardness.

residents, are not as visible as other bees that inhabit the area. *Trigona fulviventris*, another native bee, were common visitors to the breakfast table, crowding around the opening of the glass jar filled with honey harvested from *Apis mellifera* that we poured onto our granola and fresh fruit. *Apis* hives were located much further from the living quarters–several hives were located at various places on the edges of the property, such as on forest paths out towards the *cenote*, beyond the *gallinero* (chicken coop), or on side roads that cut through neighboring tracts of land. Still, when we visited the *Apis* hives, we had to be careful in our manner of leaving them, spritzing our suits with smoke as we walked back slowly lest they follow us back to the communal areas and sting unsuspecting residents. *Apis* bees also liked to congregate near water sources, like the outdoor sink, the small pool near the well, or around the compost bin by the kitchen where we disposed of kitchen scraps. *Melipona* bees, on the other hand, were rarely seen while carrying out daily garden tasks, whether watering particular areas of the garden or taking out the compost. "Whenever I'm working in the garden, it's never *Melipona* you see," Patricia tells me. "It's always *Apis*. The *Melipona*– they're always off somewhere else. It's such a surprise to see them 'in the wild', so unexpected."[201]

Patricia's passing comment gestures to a major underlying issue that continues to impact the care of *Melipona beecheii*: namely, the widespread decline of colonies throughout the Yucatán peninsula, both wild and cultivated (Cairns et al. 2005). Several reasons for this decline have been suggested, from deforestation of old-growth trees (a key habitat for *Melipona* hives) and other tree species that they depend on for gathering pollen, to the introduction of *Apis mellifera* and related hybrids to the Americas in the second half of the

[201] Field Notes, September 8, 2019.

20th century.[202] In the following section, I take a step back from the focus on the localized context of the community of Aldea Ceiba in order to explore the intertwining histories of both *Melipona beecheii* and *Apis mellifera* in the context of human-induced environmental change in the Yucatán peninsula. In doing so, I argue that the changes in intra-species relationships over time (largely due in part to changes in landscape use and human disturbance) requires a renegotiation of how care is distributed across more-than-human relationships. Overall, this discussion reveals how sustainability narratives are amended and revised in relation to place, as residents become attuned to the ways that caring for certain beings requires care for others.

7.2 Bee-stories of the Yucatán

Aldea Ceiba's cultivation of both *Melipona beecheii* and *Apis mellifera*, and the challenges presented by this entanglement, mirror more long term cultural and ecological shifts in the Yucatán peninsula. While *Melipona* bees and their honey continue to be a prized commodity and cultural icon, the cultivation of *Apis mellifera* rapidly became a tool for economic development after they were introduced in the early 20th century–first for social elites, and later for rural indigenous communities (Echazaretta et. al 1997). At the same time, this shift from the widespread cultivation of *Melipona* to *Apis* cultivation was accompanied by broader changes to the landscape, including the culling of old growth forests and replacement with plantation monocultures, in turn reducing the diversity of food sources on which native bees depend. In the following section, I briefly discuss the histories of each bee

[202] Others have suggested key reasons for this decline was that *Melipona* hives were particularly sensitive to fire, commonly in traditional agricultural practices in the region, as well as "destructive" harvesting practices (see Kerr et al. 1999). It is necessary to note, however, that the most notable proponent of this theory, Warwick Kerr, is directly associated with the accidental introduction of "Africanized" honeybees to the Americas as a result of his experimental design. Africanized bees, a subspecies of *Apis mellifera*, are highly aggressive and compete with native bees for resources, and are identified by Cairns et al. (2005) as a key reason that cultivated hives of *Melipona beecheii* are in decline.

species in relation to the environmental and cultural history of the Yucatán peninsula in order to explore the contextual factors that have conditioned the practice of keeping native bees in the community of Aldea Ceiba.

Melipona beecheii are native to the Yucatán peninsula[203] and were enormously significant to pre-Columbian Maya communities, both as a food source and as a cultural and religious symbol. Because *Melipona* hives found in hollows of tree trunks (*jobones*) could be easily collected from fields and forests and placed outside the home, it is likely that *meliponicultura* was a large-scale cottage industry, making *Melipona* honey a household staple (Quezada-Euán 2018). The organization of *Melipona* hives served as a metaphor for daily life, whereby the "ordered harmony of the hive" represented "the idealised local community" (Clendinnen 2003, 152). Products for stingless bees were used often in religious ceremonies, such as in balché, an intoxicating drink made with fermented honey and the leaves of the balché tree (*Lonchocarpus longistylus*) (Quezada-Euán 2018; Lopez-Maldonado 2010). Indeed, *Melipona beecheii* are considered to be gifts of the gods themselves (Villanueva-Gutiérrez et al. 2005), and are associated with their own god, *Muzen Cab* or *A-mucen-kab* (de Jong 1999; Lopez-Maldonado 2010).

Part of the mythological significance of stingless bees is associated with their relationship to native plants (Calkins 1974; de Jong 1999; Quezada-Euán 2018). A passage from the *Chilam Balam*, one of the only extant Maya codices, records how different groups of stingless bees were associated with four directions of the cosmos, characterized in turn by the four colors and four corresponding plants: red bees in the east (plumeria), white bees in

[203] Drawing such distinctions between "native" and "nonnative" can be informative to a certain extent. for instance, in order to understand how certain species may have coadapted with other flora and fauna endemic to particular environments, in ways that are unique from species that arrived relatively later. On the other hand, it is also important to train a critical eye on the politics involved in drawing such boundaries. As Cattelino (2017) suggests, species categories– "native," "introduced," or "invasive" (the latter with the added implication of inflicted harm) are constructs that signal particular kinds of value judgements, and which are deeply contingent on prevailing cultural attitudes (131).

the north (pacha tree), black bees in the west (laurel), and yellow bees in the south (an unnamed plant with a yellow blossom) (de Jong 1999; Sotelo Santos and Alvarez Asomosa 2018, 300). This myth speaks to both the diversity of native bees in the pre-Columbian period, as well as the relationships between bees and plants in sustaining order in the Maya cosmovision (Sotelo Santos and Alvarez Asomoza 2018).

In contrast, *Apis mellifera* reached the Yucatán in the early 20th century, much later than their introduction in other parts of Mexico (Echazarreta et al. 1997). Although the exact date of their introduction is uncertain, Calkins (1974) concludes that the first hives were brought from the United States, most likely by way of Cuba, by entrepreneurs who wanted to cater to the international market. Interestingly, Calkins (1974) suggests that this relatively late date of introduction was in part due to already existing beekeeping practices, and that "perhaps the Mayas would have had a strong resistance to accepting a bee that possessed the undesirable characteristic of stinging" (70). It has been suggested that the production of *Melipona* wax (highly prized by Spanish colonizers for use in candles for religious ceremonies) was sufficiently high enough that *Apis mellifera* bees were not imported to the Yucatán peninsula until hundreds of years after they were introduced in other parts of Mexico. At the same time, the Yucatán peninsula was somewhat "off the beaten path," lacking in infrastructure for the exportation of products like honey from the area (Calkins 1974).

The uptake of *Apis mellifera* cultivation was swift, and resulted in major cultural and economic shifts for Maya communities. Weaver and Weaver (1981) recorded that when *Apis mellifera* bees were first introduced in the 1960s to communities in central Yucatán, locals remarked that "[the *Apis* bees] were so large, the colonies so populous, and they gathered so much honey, that many of the people were convinced that these in fact were the gods of

colecab [*Melipona* bees]" (Weaver and Weaver 1981, 17).[204] Initially, the keeping of *Apis mellifera* bees was controlled primarily by a small group of social elites. But cultivation of this species was picked up quickly by small-scale peasant producers, who adapted imported technologies associated with the cultivation of *Apis mellifera* (such as the Langstroth hive) to local needs (Echazarreta et al. 1997). As a result, many producers of honey, now Yucatán's largest export, came to be controlled predominantly by indigenous Maya smallholders and *ejidatarios*[205] (Echazarreta et al. 1997, Toledo and Barrera-Bassols 2017). The number of collectives and individual beekeepers continued to increase, with an estimated 40,000 keepers of *Apis mellifera* bees practicing today (Toledo and Barrera-Bassols 2017).

In contrast, the practice of *meliponicultura* became increasingly rare. Quezada-Euán et al. (2001) estimated that only 500 practitioners or so remained at the start of the 21st century,[206] with Villanueva-Gutiérrez and Roubik (2005) noting that if the observed decline continued, "there would be no domesticated colonies left at all" (37) by the year 2008.

In recent decades, *Apis mellifera* have also become important to Maya communities' strategies for economic development, complicating flattened distinctions between "native" and "non-native" bees. Echazarreta et al. (1997) noted that peasant farmers' rapid propagation of small apiaries effectively "undermined the high yields on which capitalist enterprises were dependent for profitability," giving local farmers the leverage necessary to assert legal rights to communal lands (116). The widespread adoption of apiculture[207] also allowed individuals to work independently and negotiate higher prices for their products on the global market through cooperatives, rather than continue in low-wage day laborer roles (Echazarreta et al. 1997). Additionally, beekeeping is seen as generally "environmentally friendly" compared to

[204] Interestingly, Weaver and Weaver (1981) note that *H-men* (Mayan priests) continued to perform religious rituals associated with *Melipona beecheii* hives, but did not transfer this practice to *Apis mellifera* hives, as only *Melipona beecheii* were considered to be "protected by the gods" (17).
[205] farmers and shareholders of communal lands known as *ejidos.*
[206] see also González-Acereto et al. 2006.
[207] Here, the use of *apiculture* specifically refers to the cultivation of *Apis mellifera*.

other extractive industries. Toledo and Barrera-Bassols (2017) comment that although only 10% of honey produced in the Yucatán is certified organic, that apiculture still generally complements diverse agricultural strategies as well as the region's tropical forests. Moreover, the importance of honey production to the regional economy has also proved important leverage in promoting environmental initiatives; for example, the cultivation of transgenic crops was banned in the state following protests by honey producers (Toledo and Barrera-Bassols 2017, 268).

This began to change, however, as the potential to cultivate and export other kinds of resources from Yucatán became apparent to local elites (Pinkus-Rendon et al. 2005). The cultivation of henequen (*Agave fourcroydes*), a kind of local *agave*, exploded after the Mexican Revolution, as the use of its fibers for manufacturing rope and ship riggings became popularized throughout the world (Rioux 2014). In many ways, *henequen* was the ideal export product in ways that *Melipona* wax and honey never was; it was fast-growing, did not require fertilizers, resisted rot and pests, and thrived in the Yucatán climate and relatively poor soil unlike anywhere else (Evans 2007; Rioux 2014). The scale of deforestation that occurred in converting land to *henequen* plantations was immense, leaving few remaining patches of old growth forests. This deforestation likely[208] was disastrous to feral *Melipona beecheii* populations, both because they often build their hives in hollows within tall trees, as well as reducing the availability of food sources, which for *Melipona beecheii* consists primarily of shrubs and trees (i.e., older growth) (González-Acereto et al. 2006). These problems were further exacerbated by the fact that bees do not have a symbiotic relationship with the *henequen* plant, and therefore were threatened further by the development of plantation agriculture (Calkins 1974, 84). In this way, the distinctive patterns of landscape

[208] Because *Melipona beecheii* were not paid much attention in the academic literature until recent decades, it is not known precisely which factors led to a decline in wild *Melipona beecheii* populations (Echazaretta et al. 1997)

change brought about through colonialism (and now, increasingly, land grabbing and intensive agriculture in the region [Lawrence et al. 2019]) continue to impact *Melipona beecheii* in crucial ways, which Aldea Ceiba beekeepers cannot control but must nevertheless contend with.

The introduction of *Apis mellifera*, a species often described as more aggressive and competitive in terms of resource extraction than the native *Melipona beecheii*, became a metaphor for talking through class and race during Spanish colonization of the Yucatán peninsula. Among the Maya, *Melipona beecheii* are sometimes colloquially known as *la gente*, ("the people") (DeJong 1999; Santos and Asomoza 2018), while *Apis mellifera* was referred to as "*abeja americana"* ("American bee")[209] (Calkins 1974, 72). Ethnographic data reveals connections between bees and people in certain tellings of Maya origin myths; in one instance, a *H-men* (Mayan priest) describes that:

> God placed the bees on earth: *Xunan Kab* [*Melipona beecheii*] and others. They are like all the different races of humankind. The Maya are similar to *Ko'olel Kab* [i.e. *Xunan Kab*]. The Spaniards came and fought against the Maya. The same thing is happening between the "American Kab" [the Western hive bee, *Apis mellifera*] and *Xunan Kab*. The Spaniards started it all, and that is why the bees are fighting now. But in the beginning, it was just between the Spaniards and the Maya. The forest bees do not fight with the foreigner. But whenever "*Americano Kab*" runs into *Xunan Kab*, he bites into her wings and kills her;[210] *Xunan Kab* cannot exist.
>
> de Jong 1999, quoted in Sotelo Santos and Alvarez Asomoza 2018

Here, the connection between Maya communities and *Melipona beecheii* is made explicit, suggesting that the competition faced by foreign ("*Americano*") bees has deadly consequences for both native bees (and by extension, the Maya people). What is more, this

[209] For Calkins (1974), this suggests that the populations of *Apis mellifera* that were cultivated in the Yucatán were brought from the United States, and were not introduced from other extant populations of *Apis mellifera* in other parts of Mexico, where they had already been introduced decades before.
[210] Interestingly, while this story seems to suggest violent competition between *Melipona beecheii* and *Apis mellifera*, there is little conclusive data regarding inter-bee competition. Some degree of inter-bee competition over food resources is assumed, however, given overall decline in *Melipona beecheii* populations. See Villanueva-Gutiérrez et al. 2005 for further discussion.

mythological dynamic was mirrored by the social and economic circumstances around the time of the introduction of *Apis mellifera*; huge investments were made to "modernize" the beekeeping industry to the benefit of a small class of investors and elites, usually of Spanish or European descent (Echazarreta et al. 1997), while indigenous communities continued to struggle with impoverishment following decades of forced debt peonage and war with the Mexican government (Alston et al. 2009, Osten 2018, 20). These stories reflect in part the degree to which the social history of the region has become a part of narrating ecological relationships between the two species–characterized by cultural domination and eventual death.

The intensification of plantation agriculture indirectly encouraged a shift towards the cultivation of *Apis mellifera* over *Melipona beecheii*. For a time, foreign markets–particularly the United States–had incentivized the intensive cultivation of *henequen* and investment in the industry. The market for this fiber collapsed in the early 20th century as the United States began to search for alternatives in order to reduce their sole dependency on the Yucatecan industry (Rioux 2014, 123). The decline of *henequen* roughly corresponds with the first introduction of *Apis mellifera* to the Yucatán peninsula by entrepreneurs, suggesting that keeping more "productive" bees was seen as a possible replacement for the loss of income suffered by the collapse of *henequen* plants. Moreover, *Apis mellifera* bees ostensibly thrived regardless of their environs, pollinating whatever flowers might be blooming.

These historical developments illustrate how both bee species–*Melipona beecheii* and *Apis mellifera*–have come to be parts of the Yucatec landscape over time, but also how they are implicated in the lives of one another. The ways in which these interspecies relationships fold together and cohere is mediated on the one hand by human activities, but also by continually unfolding relationships with other species, both cultivated (e.g., *henequen*) and neglected (i.e., native trees and old growth forest). In the following section, I trace out lines

of more-than-human sociality in order to illustrate how these external interactions subsequently influence attempts to manage and care for bees.

7.3 Pollination and Pests: Tracing More-Than-Human Coherence Making

7.3.1 Plants

From an ecological perspective, the relationship between bees and plants is characterized as a mutualistic one–bees gather food sources in the form of pollen and nectar from the blooms of plants (sometimes, particular ones), which in turn aids plant reproduction through pollination. The bodily boundaries between bee and plant break down, however, when considering how bees are implicated in the reproduction of plants. Entomologist Thomas Seeley (2010) writes that "bees, with their hairy bodies and fixation on flowers as protein sources, serve as flying penises for plans, picking up pollen grains for the bursting anthers of one flower and depositing them on the sticky stigma of another," likening the introduction of bee species to any flowering area as an "escort service" (51). This is in contrast to the reproductive lives[211] of bees themselves, which are relatively short; newly born "queens," the particular bees involved in the egg-laying process for an entire hive, mate with many male bees at once in "mating flights" that last sometimes only a few minutes. The long-term engagement in the reproductive lives of plant others suggests the intimate and deeply rooted relationship between bees and the other plant species that go beyond mere "foraging behavior."

Like other social (and indeed, sexual) relationships, attention between particular bee species and particular plants is not evenly distributed. Stingless bees like *Melipona* are the principal pollinators of native arboreal species in the neotropics (Freitas and Paxton 2002;

[211] here, construed as "an exchange of genetic material"; after a queen bee is mated, she will continue to lay all of the eggs for the colony for the rest of her life.

Pinkus-Rendon et al. 2005), while *Apis mellifera* are generalists not limited by species. Tracing out the dynamic interchange between plants and bees involves attention to the literal traces of these relationships, evident in the products that bees produce from the plants they visit. Analysis of pollen, honey, and wax can provide a portrait of the kinds of plants that bees visit and make use of, but also how relationships with plants (particularly those of stingless bees) have shifted in the presence of introduced bee species. For example, studies (e.g., Villanueva-Gutiérrez et al. 2015) have suggested that as *Melipona beecheii* engaging in "resource partitioning," making greater use of leguminous trees from the *Fabaceae* family while abandoning other resources to "invasive generalists" such as *Apis mellifera*.

The particular trees that are important to *Melipona beecheii* in turn become important to the ecovillage residents that care for the bees. Walking down the road from town towards the land, head beekeeper Gonzalo pointed these out to me as we saw them, describing how they emerge one after the other in the season–*chaká*[212] and *chechem*,[213] then *tajonal*[214] and *dzidzilche*.[215] He uses the Mayan names to name each tree as we come across them, together forming a "super bloom" which provides the bulk of the nectar and pollen on which the *Melipona beecheii* relies. *Tajonal* and *dzidzilche* are of particular importance to *Melipona*, and are the "highest in demand" for export, especially to Germany. In talking about the trees, he emphasizes the annual rhythms of blooming which bring out specific reserves of resources for bees at particular times (Figure 15). "This tree, this is really important–it rescues the bee" he says, pointing out *sac yab* (*Gliricidia sepium*). "Because it seems in April, it arrives at this point where there's nothing, or almost no water to be found. And this is practically the only point, for kilometers around, where the bees can find any water. And the coolest thing of all

[212] *Bursera simaruba*, also known as "Gumbo Limbo" or "copperwood tree," is native to tropical ecozones and mangroves in the Americas
[213] *Metopium brownei*, also spelled "chechen" is a tree native to areas of central America and the Caribbean. The bark of the tree produces a burning rash when touched by exposed skin.
[214] *Viguiera dentata*
[215] *Gymnopodium floribundum*

is that this tree is flowering for almost a month and a half, from about the beginning of April to the middle of May."[216]The dried leaves crunched underfoot as he darted off to point out another tree, me struggling to keep up with my tape recorder.

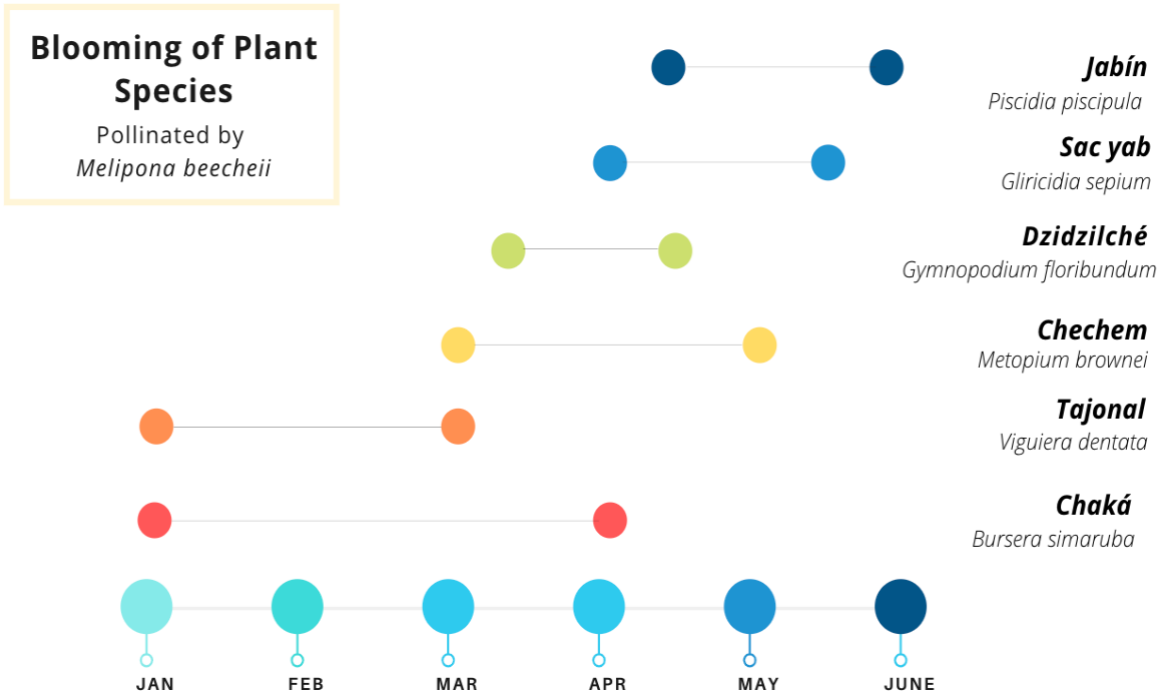


Figure 15. Blooming times of species pollinated by *Melipona beecheii*.[217]

As some of the original community members, Patricia and Gonzalo have only lived in the Yucatán for three years or so, having grown up in the highly urbanized environs of Mexico City. Regardless, Gonzalo is able to recall plant names, uses, and stories as he points out the trees that are, or will become, important to the bees at a particular point. This is no easy task: at the height of the dry season, the tropical forest is filled with what appears to be a sea of dead trees, empty of leaves and easily identifiable characteristics. But Gonzalo points out the distinctiveness of the bark of the *chaká* tree, flaky orange with a green core–and this recalls another story, more relationships. The *chaká* tree figures into a local legend, he tells

[216] *Ibid.*
[217] Data adapted from Government of Yucatán "Flora" website (https://www.yucatan.gob.mx/?p=flora) and Field Notes, March-April 2019.

us, a person who followed his brother *chechem*, repairing the damages his evil brother had done.[218] Nearby, he spots a *chechem* tree (they almost always grow near one another), pointing it out from a safe distance–when touched, the exposed bark can cause an extremely painful rash, almost like a burn. The two trees go hand in hand, as the resin of the *chaká* tree will cure the burns caused by *chechem* resins.[219]

Knowledge about the plants that fill the landscape hinges on their importance to bees, but also makes visible in the landscape a network of previously invisible interconnections. "*Chechem* is dangerous to humans, but it generates an oasis of life–it gives all this shade for forest animals, holds the humidity in the soil, it always grows in these *rejolladas* (sinkholes)–near *chechem*, we can find *guano* (bat droppings)[220] or *ramón*."[221] Eventually the talk about bees, pollination, and trees winds into talking about the various wildlife that take advantage of the trees' shadiness during their mating periods.

The state of the forest surrounding Aldea Ceiba is of central concern to residents, and often figures into the broader community consciousness and decision-making process. During tours of the land given to new volunteers, one resident takes our group to the edge of one of the cultivated areas, pointing out at the forest beyond. "This forest looks 'wild,'" he tells us, pointing to the tall trees, "but it's still recovering, this is all secondary growth. For 100 years or so, there was no forest here," referencing the *henequen* plantations and pastures which had presumably once been here. Later, he shows us an area near the solar panel towers, which had been filled with tall, young trees on my first visit the previous year. Now, they were all pruned back heavily–as I found out later, part of a long-term strategy to

[218] This myth varies depending on the teller.
[219] This was confirmed months later in another visit to the community, during which a volunteer working on a construction project sustained "burns" on a large part of his upper body, and was advised by a Maya man from the nearby village to apply a poultice of *chaká* bark.
[220] Guano is highly useful in making fertilizers.
[221] *Brosimum alicastrum*, also known as breadfruit, or *óox* in Maya. The tree is highly useful and a key plant in a traditional Maya garden: it can be used for firewood, the fruit is edible, and its seeds can be made into a kind of "flour" which can be prepared in many ways. While no longer used as a staple in contemporary Mayan cuisine, the ramón tree is still a common sight in domestic gardens in the areas surrounding the community.

diversify the agroforestry system and make it easier to harvest their fruits. “This was actually a kind of controversial decision, to cut these trees down,” he mentions to us. “A lot of people were really against cutting back so many trees, just out of principle.”[222] On another tour, a different resident points out a group of young mango trees that give a small clearing in between the showers and the meditation platform its name. “The mangoes are the indicator that our population is right–sometimes we have too many volunteers here, and our water usage gets a little high. So, the mangoes are our guide–if they are looking a little dry, that's the sign we need to limit the amount of people who are here.”[223] In such instances, trees are not only important for the resources they provide, and their usefulness for other cultivated species, but also as important in their own right.

To this extent, bees can become important indicators of forest health, providing a means for residents to surmise broader patterns or shifts in the surrounding environment by “reading” bee behavior inside the hive. During the bee care workshop, one of the beekeepers walked us through the hive inspection of four *Apis mellifera* hives at the edge of the property. One hive gave the impression that it was in trouble; the presence of many drone bees,[224] as well as the presence of uniquely shaped larval cells,[225] indicated that the hive might have been without a queen, the individual bee responsible for the reproduction of the entire colony. Moreover, much of the “food” we had provided to them in a small container–honey mixed in a bit of water–was empty. The beekeepers speculated that it might be owing to the unseasonably cold nights, which could have stunted the ongoing bloom of the *jabim* tree

[222] Field Notes, March 20, 2019.
[223] Field Notes, March 29, 2019.
[224] Drones (male bees) are “necessary” only in the mating process, and generally make up a small minority of the colony as a whole; most worker bees are female. When no queen bee is present, some worker bees gain the ability to lay eggs; however, these will always be infertile, resulting in a population of drones that is noticeably greater than usual. Field Notes, March 30, 2019; See also van der Blom (1991) for further discussion.
[225] Special “queen cells” (also called *cacahuates*, or peanuts, in Spanish) are constructed only to produce a new queen. Multiple queen cells on a frame of an *Apis mellifera* hive are an indication that the colony is without a queen, are preparing to swarm (self-divide), or are preparing to supersede an aging or ineffective queen. See Seeley (2010) for an in-depth discussion of these and other related behaviors.

("the nectar is still there, but doesn't flow as well when it's cold," one says) on which the bees were highly dependent. They concluded that it would be important to keep in mind the *dzidzilche* trees, due to bloom in two weeks; if they didn't bloom well, it would mean more manual feeding of the bees would be necessary, and the bees would be even more dependent on the next trees to bloom. Seeing the forest from this perspective, as successive waves of *floraciónes* (blossomings), calls attention to the temporal and rhythmic nature of pollination. It also reminded the beekeepers-in-training that much of the ability to "keep bees" hinges on a range of other relationships in which they ostensibly play no part.[226]

In such a sense, working with bees demands a kind of broader scale attunement with the surrounding landscape. Bees act as kinds of teachers, directing the attention of their caregivers to particular tree species, shaping what we know about them. As one beekeeper in the community tells a group gathered for a workshop, "what we have to remember constantly, is that we take out [from the bees] ...honey, pollen, the pollination, literally their *behavior*–is for our benefit. But they [the bees] also transmit knowledge–and that knowledge *vale la pena* (is worth it), because this knowledge allows us to see and get to know the forests as we know them today."[227] Caring for bees implicates caring for trees–whether by propagating trees that are important for both *Melipona* and *Apis mellifera* alike near the apiaries, or leaving a majority of their land (around 200 hectares) in a state of benign neglect ("*dejado*"), "allowing for the forest to grow back."[228] However, there is also an awareness that the relationships between bees and plants will, at some point, outstrip attempts to manage or aid them. While the hives are strategically located in areas of primary and secondary forest growth, where a greater number of mature trees grow, their land is surrounded by scrubland and degraded pastures. If the bees have enough food, they'll stay

[226] Field Notes, March 30, 2019 [morning session]
[227] Field Notes, March 29, 2019.
[228] Field Notes, March 30, 2019.

close to the community's lands, the beekeepers tell us: “but if we neglect the trees, our perimeter, the bees will go out to the lands around where we can't control what they do,”[229] referring to the application of pesticides and agrochemicals in the *ejidos* surrounding their land. While bees are one pathway to knowledge about the surrounding forest, they can also highlight how the borders between the project and the “outside world” are more porous than is immediately apparent.

7.3.2 Parasites

A significant part of beekeeping involves the control of the various pests that affect bee colonies. In the Yucatec landscape there are several potential threats to both bee brood and food stores, including ants, other bees, parasites, and mammals both small and large (indeed, some beekeepers consider humans to be a bigger threat than mites (Moore and Kosut 2013, 63). Observing hive inspections of both *Apis mellifera* and *Melipona beecheii* highlighted how particular kinds of pests tended to affect only one species or the other. Among *Apis mellifera* hives, the most observed pest was *el pequeño escarabajo de la colmena* (*Aethina tumida*), or “*el pec*” for short. Additionally, the *Varroa* mite (*Varroa jacobsoni*) was often described as a species of great concern.[230] In contrast, a different parasite, known as *nenem* (also known as a “phorid fly,” or *Pseudohypocera kerteszi*), was more common during inspections of *Melipona beecheii* hives. Curiously, both the small hive beetle and the phorid fly are “opportunists,” and therefore are not particular to any one bee species in principle (Quezada-Euán 2018, 217). During my fieldwork period, however, phorid flies were only observed in *Melipona* hives, while hive beetles were only observed in *Apis* hives.[231]

[229] Field Notes, March 30, 2019.
[230] The *Varroa* mite, along with a confluence of environmental factors, is often associated with the phenomenon of honeybee colony collapse. See Le Conte et al. (2010) for further discussion.
[231] This also correlates with Quezada-Euán's (2018) observations that, while the hive beetle is known to attack weak hives, invasion rates remain extremely low.

This correlation reflects the unique patterns of sociality that unfolds not just between particular kinds of species, but specific species themselves. The ability of pests to affect some bees more than others may be due in part to biosocial differences that are particular to species. For example, *Melipona* bees block off (or "cap") larval cells almost immediately after an egg is laid, impeding the ability of parasites to penetrate these cells (compared to *Apis* bees, which feed developing larvae gradually) (Echazaretta et al. 1997; Quezada-Euán 2001, 2018). Interestingly, the differences in bee-pest relationships seem to reflect each species' role in the Yucatec landscape. While the phorid fly is a native parasite that has adapted alongside *Melipona,* the *Apis* bees are more strongly affected by pests that are not only non-native to the Yucatán region, but are also not native to regions from which *Apis mellifera* originally spread to Mexico. The small hive beetle initially spread from North Africa, while the *Varroa* mite spread from Asia; evidently, they were each considered "minor pests" to the respective subspecies of bees which they affected (Neumann and Elzen 2004, Idrissou et al. 2019, Peng et al. 1987, Rath 1999). The ability of these pests to adapt to the behavioral patterns of different kinds of bee species (which *themselves* have adapted to new environmental contexts) underscores the emergent and dynamic quality of ecologies repeatedly exposed to "disturbances."

Differences in the threats that characterize each bee species require distinct intervention strategies and practices of maintenance. Moreover, the differences in pest behaviors draws beekeepers' attention to particular places in the hive and to particular traces or signs of life–both of the bees and of the pests. *The nenem* is small, the size of a small gnat; they are quick, and tend to fly directly upwards when exposed to light or drafts of air. The most effective way of noticing the *nenem* (and manually removing them) is by placing a fine-meshed "hair net" or similar fabric over the entrance of the box when it is opened. Blowing lightly through the fabric causes the *nenem* to fly upwards and trap themselves against the

net, and allows a beekeeper to pinch them between their fingers more easily. *El pec*, on the other hand, is more noticeable on the cover and bases of the hive box, scurrying out from cracks and edges of the wood. The small hive beetle must be killed manually, and requires speed and precision to spot them among a hive full of scurrying *Apis* bees and squash them without killing any bees unfortunate enough to be in the way.

Pest observation and removal is an act of maintenance that reveals the inextricable ways in which humans and bees are entangled. Apart from harvesting honey, aiding bees in the process of combating parasites and pests is one of the principal reasons for opening a hive and conducting an inspection. However, it may be argued that humans themselves created the conditions by which their intervention is necessary. Pests like the *Varroa* mite or the small hive beetle have emerged as a problem for species like *Apis mellifera* because of their relocation to other areas, exacerbated by the circulation of people and consumer goods around the planet (Moore and Kosut 2013, 62). Recent research has used genetic markers to correlate the dispersal of the small hive beetle around the globe with the international trade of *Apis mellifera* wax (Idrissou et al. 2019). However, the consequences of such "human assisted transmissions" may also have positive (albeit unintended) qualities. For example, Duarte-Chávez et al. (2017) postulate that the small hive beetle's (*Aethina tumida*) relatively limited damage to *Apis mellifera* hives in the Yucatán might be because their intermingling and subsequent hybridization with yet *another* bee species introduced from Africa,[232] that is to say, the increased aggression associated with hybrids of these species may limit infiltration of pests.

The cascading ecological effects produced by introductions, hybridizations, and migrations have the greatest impact on relationships like that between *nenem* and *Melipona*

[232] *Apis mellifera scutella*, introduced to Brazil by way of Africa in the 1950s. For a discussion of hybridization between *Apis mellifera* and *Apis mellifera scutella*, see Rinderer et al. 1991.

beecheii, which have coadapted with one another over long periods of time. As Quezada-Euán (2018) notes, for example, *nenem* will be quickly chased off by guard bees in healthy *Melipona* hives. At present, however, the health of *Melipona beecheii* colonies throughout Yucatán is in sharp decline. Local beekeepers report that their *Melipona* colonies are "starving" since the introduction of *Apis mellifera* in the area, suggesting that they are either being outcompeted for resources by introduced bees, or cannot find sufficient food sources because of the degraded nature of the landscape (Villanueva-Gutiérrez et al. 2005, Villanueva-Gutiérrez et al. 2015, González-Acereto et al. 2006). In light of these challenges, it becomes necessary to negotiate practices of *Melipona* care with care for other species.

7.4 Caring in Order to Care: On Knowing and Not Knowing

The "hive"–whether referring to the physical space where a collective of bees live or the collective itself–is an indispensable part of bee life, and caring for bees involve coming to know it well. Unlike other farm animals, bees are generally understood to "take care of themselves" (e.g., Moore and Kosut 2013)–bees forage for their own food, construct and maintain their own shelters, and ward off pests and other intruders. Practices of beekeeping, then, are usually carried out in the form of hive inspections–entering the interspecies worlds that bees inhabit (together with mites, other bees, and pollen gathered from distant trees), and interpreting crucial information–bee health, or poor sources of nectar–from clues gathered in these encounters. In this sense, the hive inspection illustrates well how caring for particular beings necessitates caring for, and about, multiplex networks of more-than-human relationships: a process which I understand as "caring in order to care." By caring in order to care, I refer to a kind of coherence making where practices of care for certain more-than-human others implicates the care of others, necessitating and activating the engagement of diverse knowledges. In this sense, maintaining multispecies assemblages is not just a matter of attending to species that residents use or particularly value, but is also determined by their

relationships with other beings.

Caring for bees is fundamentally a way of caring for people. As discussed above, bee care at Aldea Ceiba provides material goods, like food, wax, or new hives, and bring in a modest income through events like workshops or selling products. These material benefits are supplemented by abstract or intangible benefits as well. in the case of Aldea Ceiba, bees (as pollinators) were seen as ecological service providers; moreover, learning practices of traditional care allowed residents to develop closer relationships and collaborations with local community members. That "taking care of" bees should require defensive posturing and protective gear is a reminder that care practices are not always altruistic, but instead gesture to longstanding extractive human-bee relationships. Ironically, certain practices related to bee care, such as the removal of parasitic mites or "feeding" bees sugar water, have become more necessary because of human-induced environmental disturbances–for example, the introduction of non-native pests, use of pesticides, or deforestation.

To the extent that "care" can be understood as habitual practice, it could be said that there was not much difference between the ways that Aldea Ceiba residents regarded *Apis mellifera* and *Melipona beecheii* hives. Both Patricia and Gonzalo carried out regular hive inspections of both species, and took great care and pride in the health of their colonies. When I arrived during the dry season in 2019 in time for the bee workshop to start, many hours of volunteer labor were diverted to design, prepare, and paint "bee altars," (boxes to contain frames on which *Apis mellifera* colonies build out their hives), so that the bees would be "ready to receive new visitors" in their homes.

However, *Melipona beecheii* bees had a special place within the community, reflecting the immaterial value of bee care practices. This was evidenced on the second day of the bee care workshop. Exhausted from the heat of the midday sun and spending too long in our protective bee suits, Gonzalo and Patricia led a more relaxing activity–a mini

workshop on how to photograph bees. After using a net to capture a bee hovering above their hive in the ground (*Trigona fulviventris*), we headed down to the small area outside the kitchen where we gathered around. Gonzalo brought out a large red cooler, which had been filled with an ice pack earlier that morning. Gently, he showed us how placing the net inside the cooler for a minute or two, and then removing the bee and placing it on an upturned white board, made the tiny insect an ideal photography subject. Momentarily stunned by the change in the temperature, the bee stayed perfectly still as the workshop participants aimed their large lenses and snapped away for a moment, until the bee began to move again and flew off.

When we tried to repeat the procedure with a *Melipona* bee, something went wrong– the bee remained alarmingly stiff and still. Acting quickly, Gonzalo reached down and cupped the bee gently into his palms, breathing warm air onto its limp body. A hush fell over the workshop, and cameras fell to the participants' sides as we watched Gonzalo silently try to revive the tiny creature. “It looks like you're giving him mouth-to-mouth,” one visitor commented jokingly. Gonzalo didn't look up or reply, continuing to breathe warm air into his cupped palms. His voice turned quiet, and more concerned in tone: “come on...come on...” Suddenly, after two long minutes, the bee started to slowly move its wings. The sense of relief in the group was palpable, as we all let out a collective sigh. After a few moments longer, the bee sputtered to life in jarring motions, and finally took flight out of Gonzalo's hands. The whole experience, though lasting just a few minutes, was reflective of the special relationship that *Melipona* has with relation to the community, as well as the importance of individual bees. The health of *Melipona beecheii* hives were seen as more fickle compared to *Apis mellifera*, specifically in the sense that the causes of any problems within the hive are less certain; thus, they are more in need of care.[233]

[233] Field Notes [recorded audio], March 30, 2019.

Image 18. Bee photography module during an apiculture workshop at Aldea Ceiba.

This state of "not knowing" is a persistent theme in the keeping of *Melipona* bees, and becomes especially important in the ways that they are discursively constructed as beings that both merit study and need protection. At the start of a workshop on caring for both *Apis mellifera* and *Melipona beecheii*, Patricia and Gonzalo led us through the steps of making "divisions"–that is, creating a new colony by taking *panales* filled with larvae from several healthy hives and placing them together in a new box. After checking the hive several times over the next weeks, it was apparent that something wasn't quite right–there didn't seem to be any new larvae being produced, despite the fact that there didn't seem to be any interference from the *nenem* fly, and we had provided them with ample food (capfuls of honey) at every inspection. A call to a local beekeeper friend (and Patricia's mentor) confirmed that there was "something up" with their hives as well, but without an apparent cause. "I just don't

understand," Gonzalo mentioned to me while Patricia poured a bit more honey into an upturned cap for them, "before everyone arrived for the workshop and we tried this division, Patricia and I made another division from some of the same hives, and look at it–it just took off!" he said, gesturing to a hive on the edge of the stand where we had observed a lot of activity in the previous days. "No idea what's going on with this one... sometimes you just don't know."[234]

This was a recurrent theme in speaking with Aldea Ceiba residents involved in bee care: not only broad differences in what was known about each bee species, but also a keen sense of why comparatively little was known about *Melipona* bees: a latent politics of not knowing. As Gonzalo repeatedly emphasized during his talks and in the workshops he gave, there is much more scientific attention paid to *Apis mellifera* than *Melipona beecheii.* Answers to seemingly simple questions, such as "what determines whether a *Melipona* larva becomes a queen or a worker?" or "which materials do *Melipona* prefer to make their hives in?" remain surprisingly elusive. Despite the huge cultural and economic importance of *Melipona* bees to pre-Hispanic Maya communities, few individuals in central Yucatán, even in rural areas, are known to practice *meliponicultura* in any sort of formal way–in other words, there are fewer beekeepers around to ask for clarification or advice, and few resources (online or in print) that demystify certain aspects of beekeeping. Moreover, some feel that the "scientific" information that does exist may be limited in its scope. For example, Patricia mentions that she has heard anecdotally that *Melipona* bees produce more larvae during the full moon, but reflects that of course, this probably isn't the sort of question scientists are focused on.[235] By "reviving the traditions" of *meliponicultura*, Gonzalo tells me, they are

[234] Field Notes [audio], Workshop, March 30, 2019.
[235] Incidentally, Lopez-Maldonado's (2010) work on the role of *Melipona beecheii* in Yucatec Mayan culture suggests that the planting of *maize*, human fertility cycles, and making divisions of *Melipona* hives were thought to be interconnected and governed by the moon's cycles. Because divisions are often made when bees are producing more larvae (so as not to weaken any of the "donor" hives), the connection between lunar cycles and bee reproductivity might be borne out by future studies.

essentially carrying out the scientific method themselves–"there are so many ways of doing these things, it depends on who you ask…do you take 3, 4 *panales* [of larvae] for a division? 5? 7? Do you use cedar wood instead of pine for the new hive boxes? What we're doing, we're *filling a gap* in the scientific knowledge by using our practice as data. We're experimenting, observing, trying to unify all these knowledges (*conocimientos*) and approaches."[236]

The lack of certainty with regard to particular aspects of their care, along with the urgency that comes with working with a species that is in rapid decline, makes *Melipona beecheii* a key species in Aldea Ceiba's underlying sustainability narratives. In his talks about bees that he delivers to volunteers and visitors, Gonzalo likes to include a particular slide to illustrate his larger points about native bees. The image is a riff on the then-popular "distracted boyfriend" meme, which depicts a man (labeled as "the government, politicians, organizations, social networks, and the general public") in an exaggerated expression of lustful interest directed towards a passing woman ("*Apis mellifera*"), much to the anger and annoyance of the woman accompanying him ("*abejas nativas*," or "native bees"). The image hints that the decline of *Melipona* bees as well as the practice of *meliponicultura* in the Yucatán is due to a general disregard for native bees by just about everyone, without an apparent cause. Working with a species that is not valued on a large scale is a symbolic act of resistance that dovetails with a core component of Aldea Ceiba's mission; namely, the conservation of biological patrimony. To this end, the symbolic link between *Melipona beecheii* and the local Maya community is more valuable. While on the one hand, Gonzalo laments that Mexican laws regarding the sale of honey do not take into account kinds of honey made by native bees, he also sees "scaling up" the commercialization of *Melipona*

[236] Field Notes, Bee Workshop," March 30, 2019.

production as a potentially dangerous form of exploitation.[237]

As discussed above, the relatively lower quantity of honey produced by *Melipona beecheii* made it difficult to sustain the community's alimentary and economic needs on what those hives produced alone. Because *Melipona beecheii* hives require honey and pollen stores for their own subsistence, beekeeper residents understand *Melipona* honey to be more valuable in the hive rather than out: "we could sell it, but then the hives would be weaker, and we want that the hives themselves are growing," Gonzalo explained at a hive inspection.[238] Strong colonies that have "enough" larvae and food stores "to spare" are necessary in order to carry out hive divisions without weakening or killing the mother hive. This was even more important because many of the *Melipona beecheii* hives at Aldea Ceiba did not actually belong to the community. Instead, many of the hives were on loan from Patricia's *meliponicultura* mentor, with the understanding that any hives propagated from those on loan could be kept by the community. For this reason, exploiting *Melipona* hives as a resource became difficult to support, particularly when their health depended on so many factors beyond the beekeepers' control.

Although the beekeepers of Aldea Ceiba discursively prioritized the care of native bees, gaps in knowledge about how best to do this and other practical difficulties drew them deeper into entanglements with non-native species like *Apis mellifera*. In short, caring for *Apis mellifera* permitted the community to better care for *Melipona beecheii* by providing both an economic and alimentary lifeline. The greater volume of honey produced allowed residents to develop a small but steady market in other cities for *Apis* honey, delivered by residents on regular visits home. As the beekeeping workshop demonstrated, knowledge about caring for *Apis* bees was also a valuable economic resource; namely, teaching

[237] Field Notes, April 1, 2019.
[238] Field Notes, Hive Inspection, April 3, 2019.

workshop participants about the care of *Apis mellifera* allowed them to market their workshop more broadly, especially to those from outside of Yucatán and the surrounding regions. While seeing *Melipona beecheii* hives "up close" was a large draw for workshop participants, the potential to learn "practical" information that could be potentially transported and applied in their home countries was also an important factor in their participation.[239]

Caring for *Apis mellifera* hives also provided material resources through which Aldea Ceiba residents were able to support the health of *Melipona* hives. *Melipona beecheii* hives often struggle in times when *Apis mellifera* colonies are not, due to gaps in the times that the particular plant species they pollinate are flowering (as well as the overall decrease of these species in the forest). During these "low" times, Aldea Ceiba beekeepers support the health of *Melipona* hives by "feeding" them capfuls of *Apis mellifera* honey mixed with water ("better for the bees than the white sugar you buy in the shop"). Working with *Apis mellifera* allows the community to continue carrying out their work with *Melipona beecheii*, in that cultivating only the latter would not be economically feasible. While the cultivation of native bees at Aldea Ceiba is driven by the desire to connect with the land and neighboring communities on a deeper level, the cultivation of *Apis mellifera* facilitates this process. In these senses, Aldea Ceiba community can sustain, care for, and learn more about native stingless bee species by in turn cultivating an introduced, "colonizer" species.

7.5 Conclusion

Caring for bees brings ecovillagers deeper into relationships with other species, especially as they pertain to human plans for socioecological systems. Indeed, knowing about the particular plants or pests that are important to each bee is a crucial skill to ensure colony

[239] Informal Conversation with Workshop Participants, March 31, 2019.

health, whether the aim is motivated by concern for their conservation of threatened species for their own sake, to ensure a better harvest, or both. Just as community members hitch their livelihoods to that of both *Apis mellifera* and *Melipona beecheii* bees (among others), they are also hitching their livelihoods to a variety of other beings *by way of* each of these species and the ecological services they provide. As pollinators of crops and forests alike and as producers of honey (among other products), *Melipona beecheii* and *Apis mellifera* are both "useful" to the community in particular ways. At the same time, both species co-create their own webs of ecological and social relationships. These relationships are in turn embedded in and highly influenced by the environmental history and human-induced ecological change that has characterized the Yucatán long before Aldea Ceiba's arrival. Practices of caring for both kinds of bees might be seen as delayed responses to the cultivation practices, economic development practices, and legacies of colonialism that continue to reverberate throughout the already transformed forests and landscapes.

In drawing together *Melipona beecheii* and *Apis mellifera* hives into a unified socioecological system, the residents of Aldea Ceiba are engaged in stitching together different species stories and patterns of sociality into a coherent narrative of the community as a space for promoting conservation and traditional management practices. This "coherence-making" requires assembling sets of practices from disparate (and at times conflicting) forms of knowledge, and negotiating the care of two different species that might be understood as counterproductive or "incoherent." This involves, for example, re-examining familiar categorizations like "native" and "non-native"; instead, new stories are written, where the care of one species might enable or ameliorate attempts to care for another. How residents of Aldea Ceiba understand and practice sustainability is not reducible only to their care and cultivation of individual species, but also relationships between those species.

Bridge to Section III: Dispersal

In the preceding chapters, I have discussed how ecovillage communities are brought (or bring themselves) together and made manifest as coherent sets of practices and systems. In the final section of this work, I explore the last strand of the assemblage process, dispersal, to explore how communities in their various aspects break down, are actively unmade, or dissolve. While I find useful analogs for this theme in stories of death, illness, and waste across different communities, dispersal here does not imply a finality or permanence; instead, it also suggests the potentiality for reconstitution of different assemblage parts in new forms and constellations.

In chapter 8, I cultivate a thematic focus on death in various forms, highlighting how these figured into ecovillagers' understandings and plans for the community systems they had constructed. I draw attention to how different kinds of death are brought about or prevented, celebrated, or mourned across different communities, and interpret these as generative moments characterized by knowledge construction and landscape change. In chapter 9, I playfully extend the "dispersal" metaphor to an unconventional entity–manure–developing a picture of the community of Rancho Bosque as a "shitscape." Together, both chapters work towards an understanding of how death and regeneration are implicated in the construction of the other both conceptually and materially; in other words, how particular kinds of more-than-human deaths inform function in terms of giving rise to new practices, approaches, and understandings of sustainability.

Chapter 8. Dispersal: Death and Other Living Beings

> So, what I'm getting to is that the eco-villages go through phases just like human beings go through phases. At first maybe you're a single person then you're a bachelor, and then you find a couple, and then maybe someday you're going to have kids, and make a school, maybe your kids become teenagers and they don't want anything to do with [the ecovillage], they think it's torture to live here and they have to go out somewhere and they find out that maybe it wasn't so bad after all and then they live their own lives, and they travel like we all travelled the world, and they see the world. And so the community goes through different phases, and right now we're in the phase of, how are we going to live the phase of life which is the last chapter… the transition to eldership and death.
>
> Ecovillage Founder, Morelos, Mexico[240]

"So where are the others?" I asked. I arrived in the small eco-community outside of the *pueblo mágico*[241] in the state of Jalisco in early June, nearly five years after my first visit there. The last time I had stayed in the community in 2014 was as a volunteer, exchanging my labor (painting the exterior of a new meditation chamber and helping to construct a small earthen "hobbit hut") for two meals a day and a camping place in one of the treehouses known as *nidos* (nests). I had become acquainted with the community through their advertisement on an online network called WWOOF (Worldwide Opportunities on Organic Farms), where farms and other communities could connect with interested volunteers. While my Spanish had been poorer then, I was surrounded by company: two couples with young

[240] Interview, Huehuecoyotl, March 5, 2019.

[241] "*Pueblo Mágico*" is a special designation granted to particular towns in Mexico based on historical or cultural significance, as well as geographic or architectural beauty and a commitment to allocate funds for touristic development in the future. Pueblos Mágicos located near major cities are particularly popular weekend tourist destinations. Secretaría de Turismo, Gobierno de México [Secretary of Tourism, Government of Mexico. n.d. "Pueblos Mágicos de México [Magic Pueblos of Mexico]." Accessed October 15, 2020. https://www.gob.mx/sectur/articulos/pueblos-magicos-206528?idiom=es.

children lived in their own earth and wood houses there, and another young woman from the state of Veracruz had recently begun constructing a house on the opposite side of the hill. A graphic designer and musician from South Korea, a retired Englishman, and a couple visiting from northern Spain rounded out our motley crew. In those days, the kitchen had been bustling, with the Spanish couple making *salmorejo* soup in a bike-powered blender while others gathered herbs from the medicinal garden. In the evening, we made fires in the small pit by the kitchen, played musical instruments, and looked at the stars.

On my return, I arrived expecting a larger reception than the one that greeted me. Instead, a small group of contractors that had been helping build a new fleet of cabins on the hillside were leaving in a van. After some time, I was joined by the owner of the land, who explained that the new homes were not for residents, but for tourists who arrived on the weekends. The woman from Veracruz that had begun building her house here had recently gone back to her hometown to take care of her parents, while the other couple had returned temporarily to the nearby metropolis of Guadalajara to find work. Even the owner of the land and his small family had moved off the isolated mountainside back into the small town nearby; he and his wife were raising two small children now, which meant they needed to be closer to the local school. There were other new residents, he told me, but they too were off in Guadalajara most weeks and arrived irregularly, perhaps every few weeks: "It's difficult to be sustainable here in the dry season," he told me.[242]

I was surprised by this development. Five years previously, the community had been the feature of a regional sustainable tourism study and was described as "a self-sustainable community which offered workshops on environmental education... demonstrat[ing] that it is possible to live in a self-sustainable way, cultivating agricultural products following natural processes (*diagnósticos de competitividad*)." But all that remained of the garden was a patch of

[242] Field Notes, May 24, 2019.

bare, rocky soil surrounded by limp wooden posts and rusty barbed wire. Everyone had seemingly vanished.

Communities, like the living beings that compose them, have lifetimes and deaths of their own. In this chapter, I engage with the idea of what it means for a community to die, in part by examining how interpersonal and interspecies relationships that comprise ecovillages are unmade and transformed. Ecovillages are useful sites for understanding these dynamics precisely because they are designed with the ostensible goal of developing socioecological systems that are "*autosustentable*," or self-sustaining. However, as Buller (2013) observes of the farm (or in this case, the farm-community), "what might stand as a seemingly fixed unit is, in reality, a constant flow and passage of multiple life...and individual lives... of species intermingling" (157). Considering that ecovillages are composed of complex assemblages of beings (both human and nonhuman) that are in constant flux, on what individual lives, then, does the life of a community hinge? If, as was suggested by my interlocutors, ecovillages are indeed sorts of "organisms" themselves, what do the deaths of individual beings mean in relation to the broader whole? Finally, how can we begin to locate, temporally and spatially, the process by which broader socioecological assemblages break down and are transformed?

To begin to answer these questions, this chapter focuses on death in a panoply of forms, shades, and scales (Kohn 2013). Death is one of the fundamental characteristics of interspecies relationships (Govindrajan 2018), at the very least in the sense that the survival of one being can depend on the death of another; as Deborah Bird Rose (2013) observes, "in life and death we are never alone, either as individuals or as species" (2). The processes of renewal on which community life depends–the regeneration of soils to produce food, for example, or the growth and development of animals and plants–depend quite literally on the bodies and lives of other beings. More-than-human resistance to violent deaths imposed on them is what Lyons (2020) describes as "becoming into death," or a "mode of dying that is

an aspect of the transformation of being, an emerging into many other living and dying things much like the regenerative decay of decomposing leaves" (114). This process of "becoming into death" may involve the unravelling of the ecovillage assemblage as envisioned or initially planned, but opens new potentialities for recombination and re-assemblage.

To advance this discussion, I engage with strands of biopolitical discourse that sees life and death not as discrete and dichotomous states of being, but rather as conceptual categories that are socially maintained and negotiated (cf. Agamben 1998; Foucault 2003; Povinelli et al. 2017; Lyons 2020). Work on how more-than-human lives are rendered legible in terms of capitalist systems, particularly in agricultural settings, has done much to illuminate the messiness of life and death distinctions in the context of broader agroecosystems (e.g., Colombino and Giacciaria, 2016; Donati, 2019; Blanchette, 2020). As Colombino and Giacciaria (2016) demonstrate in their work on bull breeding, life can persist after death (in the case of artificial insemination, for example), and death can prefigure life (in that breeding livestock involves calculating lifespans and the precise moment of slaughter). In this sense, life, and death "bleed into one another," spatially and relationally complicating any semblance of clean division between the two.

Through engagement with this thematic recurrence over the course of my fieldwork, I hope to tease out the ways in which more-than-human lives–and deaths–challenge, unmake, and ultimately transform sustainable imaginaries. Understanding ecovillages as more-than-human assemblages requires an understanding of how these flows life and death are "put to work" (Colombino and Giaccaria 2016) by ecovillage residents for particular purposes; as Gan et al. (2017) argue, "to track the histories that make multispecies livability possible, it is not enough to watch lively bodies. Instead, we must wander through landscapes, where assemblages of the dead gather together with the living" (G5). To wit, this chapter explore death and the various ways it is manifested in ecovillage community life, asking how these

experiences are interpreted by ecovillage residents and absorbed into broader narratives. I outline different approaches to and understandings of more-than-human death, including "good death": deaths that conform to the expectations or desires of ecovillage residents, as well as deaths that are untimely, mysterious, or have unfortunate consequences.[243] Following ecovillagers' daily practices–at work in the garden, caring for livestock animals, or cutting back grasses and trees–revealed a gradual coalescence around patterns of care and valuation. Making visible these boundaries–between which beings are cared for, and which are not–also reveals these underlying valuation systems which become, through these bodies, bound to place.

8.1 Death and Regeneration in Ecoaldeas

At first glance, evoking "death and decline" might appear to be oppositional to the very idea of "sustainability," a term which suggests continual renewal or regeneration (e.g., Reed 2007). At the same time, death is a necessary condition for regeneration and survival of new life.

While biopolitics has been a useful theoretical angle for understanding how human life is politicized and controlled (Foucault 2003, 2007), Bird and Lynch (2019) argue that the "enfoldments" of human and more-than-human life complicate attempts to train the analytical lens solely on the human perspective: "In our home, we must comingle, eat, and thrive alongside others, including multiple species, sometimes eating each other. Our home is a multispecies mess hall. We can no longer think of this home as a single dwelling place" (313). If, as Goodland (1995) argues, "protecting human life is the main reason anthropocentric humans seek environmental sustainability" (6), the ways in which we enlist

[243] My goal in dividing my analysis this way is done with careful recognition of the potential harm in exploring nonhuman deaths from anthropocentric lenses, especially in the ways that the "nonhuman" label is constructed and applied in order to justify their deaths (e.g., Kirksey 2017). On the contrary, I emphasize the ways that nonhuman deaths defy categorizations imposed on them, and work to disrupt the illusion of human control, in terms of both death and regeneration.

other species in achieving sustainable systems has both political and material (i.e., ecological) significance.

Ecovillage residents stress the importance of the intangible (and perhaps unmeasurable) effects of regenerative agricultural practices on local biodiversity, soil quality, the water table, and other entities and measures that are not often accounted for in industrialized agriculture. Indeed, ecovillagers often outwardly reject the human exceptionalism and biocapitalist metrics (e.g., yield, cost-per-unit) that characterize these systems (Kasper 2008). Nevertheless, the ecovillages visited for this study also rely on ordered, patterned, and predictable deaths to sustain both human residents and the nonhuman residents on which they rely (Blanchette 2020). Plants and animals are specifically cultivated with the intention of harvesting them upon maturity, and microorganisms are invited into prepared garden beds to initiate the processes of decay and decomposition that renew soils. Grasses or plants might be let to grow in a particular area, only to be deliberately culled and placed as "green manure" on garden beds, which will later be prepared for planting. Understanding overarching concepts like "sustainability" (which ecovillages are ostensibly oriented towards) becomes not just a matter of asking "who or what is being sustained?" but also "which beings sustain– or are made to sustain–others?" These determinations are important components of a community's sustainability narratives, and can gesture to the qualitative differences between the practices adopted by different communities.

In ecovillages, as in other agricultural settings, the deaths of plants and animals are not only expected but often the point. Crops and livestock are cultivated largely to be consumed: either directly, by human residents, or indirectly, by supporting the growth of other beings which are cultivated for other purposes (often, as is the case with livestock, to be consumed themselves). The patterning of intended deaths can reveal the ways that communities intend for agroecosystems to be structured, and the role of those particular

beings are expected to play within a broader network of relationships. When these interactions appear to follow expected sequences of cause and effect, such deaths become what I call "good deaths," in the sense that the death of a particular being becomes (or is perceived to become) useful, advantageous, or nourishing for other kinds of valued lives.

In the field of critical animal studies, what constitutes a "good death" has often been framed in explorations of euthanasia as a form of animal care (Rollin 2009; Schuurman 2017; Schuurman and Franklin 2018). Schuurman and Franklin (2018) argue that the "goodness" of animal death is a subjective and shifting designation, "involv[ing] an entanglement of emotions, ethics, animal welfare, expertise, and human-animal relations, all of which have to be coordinated and managed" (4). Drawing on Annemarie Mol's concept of "tinkering," Schuurman and Franklin (2018) describe how the process of deciding an animal's death includes "observing, assessing, pondering, experimenting, and making numerous little decisions at the level of the individual animal" (8).

In the context of ecovillages, however, I understand "good death" to extend beyond a conception of "proper" or ethical end-of-life care for an individual. This means taking into account the other lives with which an individual is entangled, and assessing the ways in which an individual's death reverberates through networks of multispecies relationships. This line of thinking dovetails from a similar argument made in chapters 6 and 7, where practices of "caring in order to care" are highlighted in order to show that care for one being can extend to or bleed into care for others. Here, I apply this domino-effect logic to the topic of death in the ecovillage, exploring the ways that death is mobilized within a discourse of "regeneration"–in other words, the way that particular deaths are used to support the lives of others.

By curating and caring for networks of multispecies relationships, ecovillagers take up various positions to nonhuman deaths depending on the context in which they occur.

Death is prevented and mourned in some instances, but it is also invited, encouraged, or even celebrated. In this sense, the death and decay of particular beings can be seen as useful or beneficial, in that they correspond with ecovillagers' plans. Cultivating more-than-human lives involves making choices about death, and these choices are suffused with affective bonds and practices of meaning-making (Schuurman and Franklin 2018). As Donati observes of agricultural spaces, "intimacies of affection and care sit uncomfortably alongside the reality of slaughter" (2019, 126). Govindrajan (2015) points out that these "relational, embodied entanglements" of kinship relationships between humans and nonhumans are "forged not only through practices of embodied care but also in the crucible of embodied violence" (506).

In this sense, "care" and "violence" are not relationally opposite concepts, but rather exist together on a fuzzy continuum; occasionally, they can be rendered in the same act. The act of animal sacrifice is made powerful precisely because of the attachment of care (Govindrajan 2015); that is to say that understandings of "good death" follow from and take root in understandings of a "good life" (Govindrajan 2015; Schuurman and Franklin 2018). The messy entanglement of care and violence is evident not only in sacrifice or slaughter, but also in the mundane day-to-day work of maintaining agroecosystems. For example, the action of plucking an undesired plant from a garden bed in order to leave more space, nutrients, or light for a favored other (as is the case when a garden is "weeded") is laden with either violence or affection, depending on the particular being that the act is framed in relation to.

This discussion extends ongoing inquiries of how humans implicate more-than-human bodies in broader structural systems, like capitalism, to asking how nonhuman bodies are tied up in knowledge formation. The breakdown of these systems–or as I discuss later in this chapter, whole communities–is the result of a disarticulation of the constituent elements

which comprise them, and which themselves are constantly in fluctuating patterns of contingency on one another (Buller 2013). Such disruptions are informative, in part because they reveal the inadequacies of ecovillagers' preliminary plans, or understandings of how nonhumans *ought to* interact with one another. If it is expected, for example, that livestock will sustain themselves by browsing undesirable vegetation (i.e., "weeds"), the preferences of sheep for cultivated greenery (or worse, aversion to native flora) is an issue of major consequence for human plans.

These gaps between human designs and reality, I argue, is the ground on which ecological knowledge is produced. As other beings challenge these expectations with their own lives and bodies, ecovillage residents engage more deeply in dialogues with other species. The unexpected death of a colony of bees, a young animal, or transplanted seedlings are events that trigger further investigation and experimentation. These become moments where shifts in logic, and sometimes practices, occur (i.e., the sheep died from parasites from malnutrition, therefore diet is the cause, which justifies cutting down particular trees). Broader assumptions about human-environment relationships are also reflected through the way that ecovillagers explain and process deaths (for example, concluding that the death of a beehive is not due to the individual failings of a caregiver, but rather because, for various social and historical reasons, there are few native trees for them to pollinate.) These assumptions in turn inform broader sets of practices in each community, either through legitimating or challenging residents' working understandings.

8.2 Useful Lives, Useful Deaths

Ecovillagers are often engaged in experimentation with a wide array of agricultural practices, each relating to their own ways of making sense of ecological relatedness. Deaths that occur according to plan can work to confirm or justify these underlying assumptions.

These kinds of expected life-death sequences, I argue, are particular to each community, reflecting ways of engaging with agricultural and ecological knowledge frameworks in ways that are rooted in the broader social and environmental contexts in which they are enmeshed.

The cultivation of livestock animals and poultry is a clear example in which animal death is prefigured. Not all ecovillages consulted in this project cared for livestock, but almost all had at least a small poultry operation, with the intention of consuming animal products or benefiting from their consumption by others (i.e., through the sale of meat or other animal products). Rancho Bosque differed from other communities in that the care and use of animals was a central component of community philosophy. Rancho Bosque residents raise animals with the intention of consuming them within the community, selling processed animals and animal products to local consumers, or selling live offspring to other local farms with the knowledge and understanding that they will be eventually slaughtered. The killing of animals is a solemn process; a sign on the outside of the room where animals are processed and cleaned is labeled like the other classrooms and common areas–*cuarto de sacrificio*, or the "sacrifice room." This privileging of animal lives was not only because animals were a primary source of food. They were also valued for the other kinds of work they provided–for example, turning the soil in the process of rooting for crops (pigs), eating/controlling insects in the gardens (chickens), and providing manure for producing compost (stabled animals, like goats and sheep). These services are broadly understood as beneficial, even though they are not necessarily directed; rather, they come about through an organisms' particular lifeways (eating, rooting, defecating).

Ecovillage communities differ in the ways that they understand the necessity of particular nonhuman deaths. Internal values and ethical conversations particular to each community are reflected in the kinds of animals they choose to raise and consume, with the understanding that these animals will be consumed or used in one way or another (either their

flesh, their labor, or their offspring). The question of which animals are raised and which are not is not always a matter of taste, but also what is possible to cultivate on the land in which the community is founded. Aldea Ceiba residents and visitors almost exclusively prepared vegan meals during communal mealtimes, occasionally using eggs produced by their chickens or those purchased from local producers. However, these dietary choices reflected less on community members' ethical orientations, and more the practicalities of community life: for instance, the lack of a refrigerator in the forest camp kitchen, making it impossible to store foods like milk or soft cheeses for more than a few hours in the humid Yucatán heat.[244] Residents of Rancho Bosque, on the other hand, tended to view vegetarianism skeptically at best, and misguided at worst. As one long-time resident told me, consuming animals, and therefore cultivating them, was seen as a far more "ecological" way of caring for landscapes and soils. In another instance, a volunteer cook was admonished for preparing a meal with tofu purchased in town; the offended resident remarked that the destructive monocultures of soy and wheat necessary to produce vegetarian meat substitutes were far more harmful than eating the meat cultivated on their land.[245]

The way in which death occurs matters greatly to how an animal becomes useful to others following its death. In Rancho Bosque, animals that were to be eaten needed to be directly killed. When an adult sheep died quite quickly in February, it was quickly concluded that the animal would be burned, not eaten (as a young man who tended the cows had suggested). "We can only eat 'live' meat, animals that we kill ourselves," explained an older farmhand, who lived outside of the community but arrived every morning to work in the fields with the others[246]. Deaths can also be useful even if they are unintended. While chatting with a resident of Aldea Ceiba outside of their small house in the nearby town, we

[244] Indeed, several residents relished the opportunity to eat meat when purchasing meals for themselves either in town or during trips to nearby cities.
[245] Field Notes, February 2, 2019.
[246] Field Notes, January 14, 2019.

both watched as a pigeon had inadvertently flown into a live electrical wire on the roof and dropped out of the sky. “Dinner came to us!” said the resident playfully, bounding up to the roof to retrieve the headless corpse, which was later offered to me cooked up with a side of rice.[247] These instances reveal the shades and subtle differences in interpreting the manner and appropriateness of different kinds of more-than-human death, differences in meaning which are (or become, through their repetition and concretion) distinctive to each community.

Death can be “useful” to the extent that it can serve as an indicator of the health of an overall group of plants or animals, or the health of a system overall. Certain more-than-human lives are sometimes enlisted to facilitate the processes of death and decay of others. These include microorganisms that help to decompose organic matter, as well as animals or insects that prey on or consume “unwanted” species (e.g., weeds). In this way, death can be used strategically to bring about new life; for example, by making available nutrients to the soil as compost, or sustaining plants and animals that human residents rely on for their own consumption. In Aldea Ceiba, this manifested in the specific cultivation of organisms associated with decay and decomposition. The lead gardener demonstrated a technique he had taken up at a workshop, when a small band of participants visited a cenote in the forest known as “*las palmeras*” due to the large, mature coconut trees growing in a small island in the center. Previously, Pierre had taken some *jicaro* bowls filled with rice, molasses, and a few small roots gathered from around the base of the coconut trees and buried them there, hoping to attract and propagate the same community of beneficial microorganisms. These microorganisms could then be added to soil preparations for other kinds of trees to develop a “diverse” microbial and fungal community.[248]

[247] Field Notes, June 13, 2019.
[248] Field Notes, October 26, 2019.

The deaths of some beings are important for the survival and flourishing of others, and the ways that death is mobilised for these ends reveal how ecovillage residents creatively negotiate and prioritize different kinds of lives in carrying out their projects. One example of such a "useful death" was the case of a kind of grass called "Mombasa" (*Panicum maximum*), that grew abundantly in a corner of one of Aldea Ceiba's cultivated areas. Although the grass was not an endemic species (but was rather from Africa), the dried grass had been purchased in a nearby village, and was used as thatched roofing in the community's first structure. When the roof was replaced, the Mombasa grass that was removed to an area of the garden had begun propagating, growing up among the squash, beans, and other crops that had slowly taken over the small area. Pierre and I began to cut the tall grass back with a machete, with the aim of using it to cover the exposed soil in a nearby garden bed. "Because the grass propagates through the stalk, rather than through the seed, I actually prefer using the Mombasa more than another grass that grows here," Pierre tells me, explaining that this characteristic made it more useful as a kind of *abono*, or green manure: "it's less likely to sprout in the beds and take over…just 'chop it and drop it.'"

The benefits of cutting back the grass to the other plants cultivated there was readily apparent. As we moved through the beds, Pierre pointed out the other plants that were being to grow well in the area: *Chaya* (*Cnidoscolus aconitifolius*, or "tree spinach"), corn, beans, passionfruit, cacti, pineapple, and *pixoy* (*Guazuma ulmifolia*), a native tree with edible seeds. Pierre continued: "in agroecology, everything is based on systems... energy transfer, mineralization, decomposition. The goal is to tap in and use these cycles, so we're bringing in these processes here, spreading it out and inviting decomposition in." Cutting back and placing the grass in particular spaces helped to build up the biomass in the soil, he told me, which was possible for all the plants around us to thrive.[249] From this perspective, the

[249] Field Notes, October 9, 2019.

cultivation of microorganisms and the selective cultivation (and cuttings) of non-native grasses served similar functions: by "inviting death into" the garden beds, we were helping to ensure that plants useful for the community would continue to grow.

Image 19. Bowls made from the dried fruit of the *jicaro* plant (*Crescentia alata*), after being buried by the roots of coconut trees at different points around Aldea Ceiba and then later excavated. The bowls were filled with compost, soil, biochar, and organic matter, with the intention of cultivating communities of microorganisms that are particularly beneficial for specific tree species.

8.3 Managing Death

Ecovillagers often relied on one species to mitigate the effects of another, even those species they consider outside of their direct control. The subject of bird deaths was the focus of significant community attention in Aldea Ceiba in particular, and highlighted ruptures between differing conceptions of what it meant to live a more sustainable life. A community meeting for the *semillas*, the original founding group members of the community, was called to discuss the issue of bringing two cats, community pets which had lived with the group in Mexico City, and which up until now had been confined to the house the community owned in the small town nearby. The group had been hesitant to bring them to the forest–not entirely because they worried for the safety of the cats, but because they worried for the safety of the local fauna. The presence of the cats had been suggested in a group meeting to control the presence of rats in the kitchen spaces because keeping them out of the food storage areas was proving challenging. Before, the loss of a few half-nibbled tomatoes or cucumbers was only a mild nuisance. Following the mysterious outbreak of a stomach bug, however, the concerns about the rats as potential vectors of disease intensified.

The discussion of rats, cats, and microbes revealed a deep perspectival divide within the community. Two members, passionate about conservation education and founding members of a birding group for local youth, argued that "bringing the cats to the land" went against the key goals of the community: to conserve the surrounding natural spaces and wildlife. They were incredulous that the others might consider endangering the forest wildlife by bringing the cats in from the town to the forest. As one long term resident told me, "all of the work that [my partner] and I do with birding and conservation education–we actually work on projects to minimize cat and bird interactions. We showed them academic articles, you know, these things are based on facts–I think the thing with the cats, people have strong

opinions about it because there is still attachment to the life we used to have back in Mexico City."[250]

On the other hand, other residents pointed out that leaving the cats in town produced its own consequences for the community's ecological footprint. Caring for the cats in town by placing out bowls of dried cat food had attracted other stray cats in town, which had gradually snowballed; continuing to care for an ever-expanding cat population was not possible, they reasoned, in the long term. The cats were expected to at least ward off rats from kitchen stores, but ideally would kill and eat their prey; this situation would be all the better, as it eliminated the need to purchase the commercial dried variety on visits to the city, which required time and fuel. Finally, feeding cats obviously had to be done on a regular basis and at certain times of the day. Since the project's house in town was at least a 40-minute drive down bumpy dirt roads that weaved through farmers' parcels and patches of forest (or over an hour and a half by foot), planning around the town cats had become an obstacle to moving community operations to the forest site more permanently. Ultimately, the affair triggered a decision-making process that relied on a consensus of the *semilla* group to come to a resolution. It was eventually agreed that the cats would be brought to the land, but subject to a trial period; moreover, they would be required to wear bells on their collars, to help alert birds to their presence.

Within the span of a week, a dead rat appeared one morning just outside the doorway of the cooking area. News of the rat's death spread quickly, and one *semilla* member was exuberant at the communal breakfast that morning: "the cats are already getting to work!"[251] The death of the rat was celebrated because it confirmed inclinations about the role that the cats would perform as members of the ecovillage multispecies community; in killing rats,

[250] Field Notes, April 2, 2019.
[251] Field Notes, April 7, 2019.

they were performing as hoped (although an absence of bird corpses, it was acknowledged, could hardly confirm their lack of impact on local bird populations). At the same time, the affair with the cats and the birds illustrated the relational politics involved at all levels of decision-making. By way of a sort of subjective mathematics, the lives of "wild" birds were rendered in terms of gallons of gasoline (necessary to bring passengers and designated cat feeders to and from the forest), tomatoes (lost to the undeterred rat population), and affection for aging city cats. In this sense, community sustainability narratives extended beyond the boundaries of the community itself to encompass other beings and entities that were linked to their activities.

Living in proximity with other beings, both cultivated and uncultivated, required tolerance of and attention to forms of death that occurred outside the realm of ecovillagers' control. Another constant threat in Aldea Ceiba was a small insect known locally as *la chinche besucona* (*Triatoma infestans*, or "kissing bug"). The small, winged insect, which lives in the cracks of the stone foundations common to traditional Maya houses, emerged at night to feed on the blood of domestic animals or humans, and exploited any holes in hammocks or mosquito netting to reach their prey. These insects are considered the primary vector of a disease known as chagas, caused by a parasitic protozoon (*Trypanosoma cruzi*) which causes long-term chronic cardiac and gastrointestinal issues in those that contract it. In the worst cases, chagas can be fatal, even if the sufferer is initially asymptomatic (sometimes, for decades). [252]

Nearly every resident who had spent a good deal of time in the community had had encounters with the insect,[253] and many had flatly accepted that to live in the forests of central Yucatán meant dealing with their presence, especially during their mating season

[252] "Chagas Disease," last reviewed April 13, 2022, https://www.cdc.gov/parasites/chagas/.
[253] During my first visit to the community in June of 2018, I was also bitten by the insect. Because the insect was killed before it could be captured and brought to a lab, I have no knowledge whether this creature was indeed a vector of chagas or not.

when they were more prevalent. Absent the jaguars once common to this area, *el pic* (as the insect is also colloquially known) was the closest being to a predator that the community contended with on a regular basis. Killing the insects, which would fly out from the stone walls while we sat around in the communal palapa in the evenings, became a perfunctory pastime. A young German man who lived several months of the year in the community racked up an impressive number of nightly kills, attributing his success to the development of a sense of when the chinches were "watching" him. Other residents resigned themselves to the fact that regardless of the effort expended, the insect would always be a potential threat. They justified their apathy, part jokingly, by reasoning that "if it were a problem, they'd paint it on the wall," referring to the anti-malaria murals painted on village walls sponsored by the regional health authority. [254] Still, the constant influx of volunteers from other areas of the world where the insect is not known made it important to communicate the potential dangers of encounters with the insect, which they relayed in daily community meetings and informational signs ("if you see *EL PIC*, kill it, close your tent well, don't scratch, and ask for help!," said a sign located in the community workshop).[255]

Combating *el pic* brought Aldea Ceiba residents into unlikely alliances with other beings that preyed on the bug. An unintended benefit of bringing the cats to the land was that they proved to be somewhat of a deterrent, and the ducks that wandered into the palapa would eat up the bugs they found. Perhaps the most unlikely ally came in the form of the swarms of army ants (*Eciton burchelli*), known in Maya as *xulab*,[256] that roved around the forest floor hunting for prey. The *xulab* swarm can form without warning with unpredictable trajectories, at times taking over a resident's tent, or sprawling on the path between the

[254] Field Notes, May 6, 2019.
[255] Field Notes, April 13, 2019.
[256] As suggested Closs et al. (1984), *xulab* in Maya also refers to the planet Venus, and the linguistic similarity could refer to a mythological association between the gods associated with ants, Venus, rain, and maize; alternatively, Milbrath (1999) suggests that the "bite" of the ant in leaves could have been associated with the Venusian eclipse. Suffice it to say that this species has had strong cultural significance for the Maya historically.

common house and the cooking and dining areas. The sea of swarming ants was often not visible until an unsuspecting person had unwittingly stepped in the middle of their swarm.

Despite the nuisance these ants can cause in certain situations, their presence around the *palapa* was always regarded as a necessity, and at times even welcomed. "The ants are our cleaning service," I heard several times throughout my stay. The presence of these swarms, even unseen, can be felt in the movements of other insects, as the ants bring other beings out of woodwork (or rather, the *stone*work), corralling scorpions, small snakes, and mice out from the crevices and holes of the stone foundations, at times overtaking them and devouring them. These hunts often placed ecovillage residents in precarious proximity to species that could potentially harm them. One resident, who arrived late to the breakfast table and had missed the warnings to be more mindful of the increased activity of other beings around them, was promptly stung on the foot by a scorpion fleeing the *xulab* as she walked across the floor of the communal dining area.[257] The unruly and unpredictable nature of the swarms–where they would coalesce, and for how long they would last–required ecovillagers to be watchful of signs of an approaching swarm, and surrender the space if necessary. These encounters often served as embodied (indeed, painful) reminders of the ongoing social relationships of other beings occurring in the midst of ecovillage projects that evaded human mastery.

8.4 Bad Deaths

"If we had done something thirty days ago, maybe there would be something that we could do," Alejandro told me. Now, even with the *carbón* (activated charcoal) we fed her, there's nothing we can do for her." He gestured towards the small lamb in his lap, which limply refused the nipple of a baby bottle filled with a mixture of water and charcoal. The

[257] Field Notes, October 12, 2019.

previous day, the lamb's mother was discovered dead in the stables when the others were moved out to the pasture for the day, presumably due to the same affliction that was affecting its young–listlessness, lack of appetite, and inability to walk or breathe without effort. He bundled the lamb in an old towel and placed her in a cardboard box, which he brought into the dormitory and placed by his bedside to monitor her health over the evening. When the morning came and the lamb was discovered dead, Alejandro was quieter than usual at the communal breakfast table. Nevertheless, he silently heaved the box up the hill with him to the upper pastures that morning, where a makeshift burn barrel had been constructed, her mother already burning.[258]

The death of cared-for animals–in this case, an ewe and her young lamb–sometimes occur without warning. These moments of disjuncture between expectation and reality invite their caregivers to reflect on the circumstances (both within their control and outside of it) that bring about this end. The wellbeing of cultivated species is not necessarily contingent on how they are cared for; a plant might still die, regardless of how attentive a gardener is to the soil, weather, or pests. Deaths that are unexpected (or at least, uninitiated by human residents) can be seen as the ultimate act of resistance to being made to fit together with other species in particular ways, or to participate in human plans (Callon 1986, Murdoch 1997, Pearson 2015)–what Donati (2019) calls a "failure in conviviality." Such instances foreground the lack of control humans wield in the face of death–of other beings, and of themselves. Unplanned deaths–such as the death of the sheep after a mysterious illness–gesture towards the aspects of sheep lives that evade human management, such as the hidden work of microbes or viruses. In this sense, the death of cared-for beings can also reveal the limits of that care–the boundary between that which the caretaker has sufficient control, and that which they do not. These lines are not always clear, nor are they consistent from

[258] Field Notes, February 9, 2019.

community to community; rather, they are constructed in place and by community members.

Image 20. *Registro de Muertes*, or "Death Register" at Rancho Bosque community, was a shared document where shepherds within the ecovillage recorded deaths (planned and unplanned).

In contending with unexpected death and illness, ecovillage residents engage with the construction of ecological knowledge by piecing together explanatory models with their own observations. For example, one of the head gardeners of Aldea Ceiba stressed taking an agroecological focus to explain plants that are declining in health or dying from whatever cause. "The perspective of agroecology doesn't see 'pests' (*plagas*)," he told a group of volunteers who had arrived one week prior. Because it's not as if an aphid, a *pulgón,* or a fungus is 'bad'. It becomes a '*plaga*' when the system is out of equilibrium, when it's out of balance. Because they have a role, a function in this place...it's only indicating something

about the place, because the conditions for it to be here are right."[259] Throughout my time in Aldea Ceiba, working in the gardens with Pierre became a lesson in attending to other kinds of more-than-human indicators of being in (or out of) balance.

Ecovillagers can also bring about death inadvertently, either as a result of their inexperience or misinformation. At one community, several newborn goat kids died from being inadvertently overdosed with selenium supplemental injections, causing the residents to reassess their fledgling skills caring for herds of goats. A hive of bees gifted to Tierra Madre by a local beekeeper was nearly damaged when residents misunderstood key instructions for supporting the health of the hive. The local beekeeper had told them to feed the bees a solution of sugar and water so that the bees might propagate more quickly; having the feeling that brown, unrefined sugar would surely be more "natural" than the white processed sugar used for baking, one resident returned triumphantly from the weekend market in town with a sack of brown sugar, both an expensive and rare find. Unfortunately, she later discovered upon Googling the procedure in question that unrefined sugar was indigestible, and potentially toxic, to *Apis mellifera* honeybees (luckily discovered before application).

Ecovillage residents can use animal and plant deaths to diagnose gaps in communication and maintenance practices in daily ecovillage life. Failures in communicating, either with other caretakers or with the living beings one is responsible for maintaining, are often at the peril of nonhuman lives. This was the case one morning when a new arrival to a community eager to help mistakenly gathered fertilized eggs from the chicken coop that were being incubated by their mothers, not realizing the difference between eggs containing live embryos and those with only yolks. The resulting surprise while making omelettes for the communal breakfast warranted a point of order at the next

[259] Field Notes, August 11, 2019.

community meeting to address the "chicken massacre."[260] In other communities that relied on volunteer labor for the upkeep of gardens, the deaths of plants in particular areas of the garden could be construed as a sign that the individual responsible for the area had failed to properly attend to their duties.

At times, however, unexpected deaths revealed the limits of particular agricultural practices in place. In Rancho Bosque, a small hillside was cleared of trees to cultivate strawberry plants that ultimately failed to grow, even though they were transplanted from another garden patch just a small distance away. In Tierra Madre, seedlings tended daily with waterings and soil preparations of *lombricomposta* (worm castings), perlite, coconut coir, and compost–all purchased outside the community and transported at great expense–died almost instantly upon transplantation. The towering cornstalks over the metal retaining wall that separated the boundaries of the community from the neighboring plots, compared to the wilting seedlings in Tierra Madre's beds, was a source of resentment that week within the community. "We should have planted *corn* weeks ago, not these other things! How can we be so out of touch?" complained one resident. Understanding these events as examples of nonhuman "resistance" or "dissidence" in response to human plans (Pearson 2015) glosses over the complex relationships these plants are enmeshed in–with soils, insects, animals, and fungi–the aggregate of which, in these instances, fail to sustain them. Rather, such "failures of conviviality" (Donati 2019) gesture to the unaccounted for (or potentially unknowable) dimensions of plant lives that complicate their cultivation or domestication.

The role of particular species within a system can vacillate between helpers and problem-causers in community narratives, depending on the ways in which they perform as expected. This was exemplified by the role of flies in ecovillage communities. In Aldea Ceiba, flies–particularly black soldier flies (*Hermetia illucens)*–were cultivated for the

[260] Field Notes, April 15, 2019.

purposes of accelerating composting. Larvae of the flies were encouraged by setting aside particular kinds of refuse (largely, fruits and cooked vegetables) for the purposes of propagating decomposers. At least two members who dedicated themselves to maintaining the community's compost piles described flies generally as kinds of "ally" species–not only helping to decompose organic materials, but also becoming themselves a potential source of food for other animals (such as chickens, ducks, and turkeys). During the dry season, however, many community members came down with a particular illness, of which gastrointestinal distress and extreme fatigue were the primary symptoms. This period of illness coincided with a time of year in which flies were prolific, covering dining and food preparation surfaces in a swarm of black. While some attributed the outbreak to the presence of the flies, others dissented–perhaps the stomach pains and sulfur-smelling burps we emitted were caused instead by a parasitic infection brought about by a malfunctioning water treatment system, or bacterial contamination caused by poor hygienic regimes around mealtimes.

The sudden narrative shift concerning the fly's relation to the broader community– from ally to enemy– illustrates the importance of context in the ways that ecovillagers understand interspecies relationships and draw conclusions about the relationships between potential vectors of illness and resulting deaths (c.f. Sodikoff 2019; discussed further in chapter 8). Moreover, the implications of flies (as a categorical grouping of insects) as vectors of disease illustrates how particular species are burdened with associations that may or may not exist–in this case, the flies covering the kitchen surfaces were a different species altogether from the ones being cultivated. Rejecting the flies as the cause of the illness, however, had distinct material and practical implications. The insistence of one prospective member that everyone in the community ought to begin a regimen of anti-parasite medication, while others countered that better hygiene in the kitchen was necessary,

ultimately led to a series of events in which the prospective resident left the community.

Events where the cause of death is unknown prompt reckonings and reassessments of forms of knowledge, even by skilled practitioners. A story related to me by several residents of Aldea Ceiba, and their first attempts cultivating gardens in the tropical forest of central Yucatán, illustrates how ecovillagers contend new forms of knowledge and agricultural practice in response to what they considered difficult-to-diagnose deaths. In the first year that residents began to work at the land, they experimented widely with different practices sourced from their experience with permaculture and agroecology, including *hügelkultur* raised beds, and the development of curved stone walls to prevent erosion. In an effort to avoid cutting down any more trees, a practice that residents viewed as counterproductive to their mission of restoring areas of the forest, they chose areas that were relatively uncovered by tree canopy to begin planting, and built stone walls to prevent erosion of the soil. Looking back on these early attempts, one resident laughed: "it was totally ridiculous, because there're no hills...[261] and [another resident] was like, 'we need to do it if we're going to preserve the soil!'...thinking that was where we were going to grow our food for the rest of our lives...well now, all those walls are all buried under grass and weeds." [262] Particular crops (notably, carrots and other root crops) seemed to be especially difficult to cultivate: "we never accomplished having enough root matter for roots to develop, so seedlings would come up but the plant would never really fully grow."[263]

In these instances, residents of the local Maya community whom they had hired and worked with to begin the process of cultivating the land became invaluable to determining what practices were appropriate for the area. This involved greater attention to and understanding of the potentiality of particular places based on certain attributes rather than

[261] and therefore, presumably, no particular purpose in adopting practices that counter-acted erosion such as building "key line" walls.
[262]Interview 1, E.M. (June 27, 2018)
[263] *Ibid.*

others. In speaking with local farmers, residents learned that patches of red-orange earth (*kan kab*, in Maya) were more important indicators of productive areas to plant than were spaces with little tree cover. Moreover, they learned in time that the local practice of burning land before planting (or at least pouring boiling water over the soil), initially regarded as somewhat destructive, was actually crucial in killing nematodes, a kind of soil-dwelling microorganism that had presumably eaten away at the roots of the first crops they attempted to cultivate. The value of such practices became apparent over time in working with locals from the community. As one resident explained of a local man who came from the village daily to work with them:

> Victor was pretty shy…well not shy, but he was not proposing stuff, you know, he was not telling us how to do it, he was just there. Even if he thought it was ridiculous, he would just go along with it and not say how it was supposed to be...sometimes we worked too slow for him, and he would just pick up his tool and go on doing things [like preparing places for tomatoes]. He would do it in a way that, in the beginning it was like, 'oh man, we should tell him not to…burning stuff, and cutting down trees mercilessly, I don't know...' (laughs).
>
> But then we saw results from what he did, and we didn't see results from what we did, from what we wanted...what we thought was right.
>
> That was kind of the moment where those two ways of being, or approaching agriculture clashed. Like ours, was imported knowledge…things that we had read from books, or we had taken workshops, of like, organic agriculture, but mostly, urban organic agriculture. We came from this urban context [of Mexico City], none of us came from a rural area, or even had the slightest [idea] ... or, if we had had experience, it wasn't here in Yucatán.... with Yucatán soil, the topography is unique in the world. And the Mayans…if anyone should be considered the only people that hold some truthful knowledge and how to survive on these grounds, they know. They've cultivated this land for two thousand years…if anyone knows, it's them."[264]

The realization that methods such as burning or cutting down trees, were effective in unanticipated ways led ecovillage residents to reconsider the preconceptions of their "imported knowledge," and to rely even more closely on local practitioners as guides.

[264] Interview 1, E.M., June 27, 2018.

Instances such as these reflected key differences in how death was understood and managed– and more specifically, how death was operationalized to bring about new life.

8.5 Death of the Ecovillage

One chilly night, the Rancho Bosque community gathered in the *Aula* (classroom) to watch a documentary, *La Raiz,* which profiled several ecovillage projects in Colombia. One of the speakers of the film began talking about the origin of conflicts in an ecovillage, and how it was difficult to manage the diversity of people. He began with the example of 30 people: "And not only them, but the interrelations of 30 that are hundreds of possibilities... then each one of us has these possibilities: to be an individual, to be one plus one…but when it interrelates it multiplies."[265]

"What? This is confusing. Explain this... this social circle idea," (Figure 27) bellowed Jens, one of the community leaders. Micha, a quiet young man who split his time between working with the goats and in the bakery, went up to the blackboard and sketched an interconnected web. "Well, it's like this… if the project starts with three people, and those people convince more people to come, the community grows… but if one person leaves, then the people connected to them leave. If Alejandro leaves, Fredi would leave, and if he leaves Sal might leave. However it is in the end, it's not the same as before."

[265] Danna Juliana Pineda R (2017) *Raíz,* [17:35-17:43].

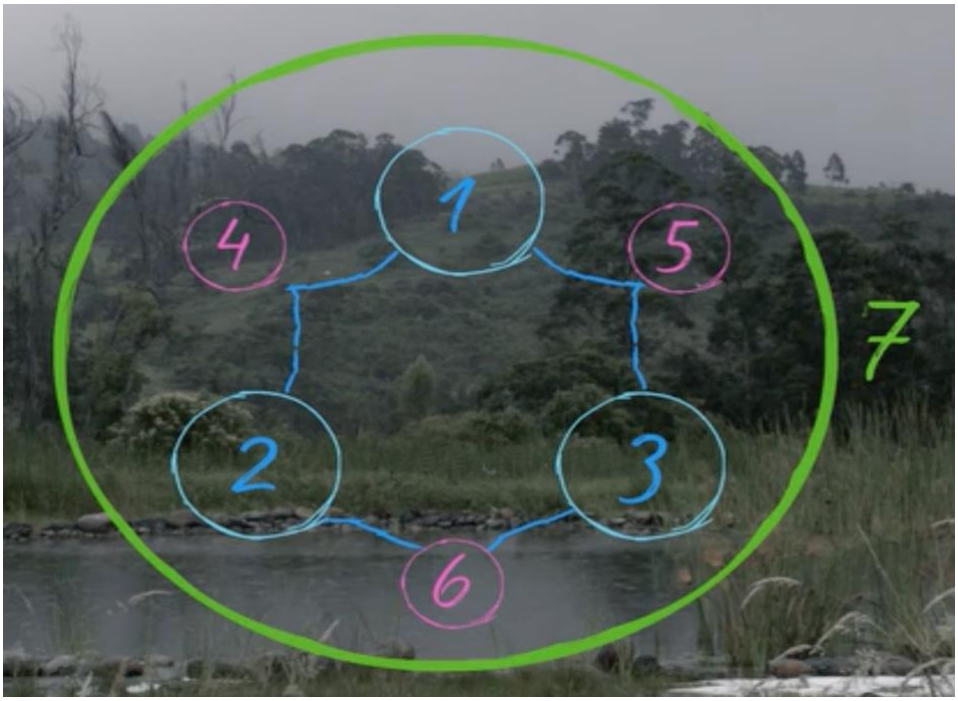


Image 21. Still from the video "La Raiz" [17:55] depicting the potential combinations of relationships in ecovillages. Numbers 1-6 indicate how individuals in communities might be joined together in combinations of relationships. The circle (labeled 7) indicates the community as a collective being itself. Credit: *Raíz Documental*, Danna Juliana Pineda R.

Jens remains unconvinced, stuck on the fact that much of the footage seemed to center on relatively young alternative folks, with gauged facial piercings, dreadlocks, and tattoos, talking about the power of living in community. "But where will they be in 10 years?" Jens exclaimed. "I don't see any old people–there are hardly any children. Maybe they can only survive in times of rain, well, what happens when the rain goes away? Is it just puppies and kittens running around–don't they eat anything?" Many of the younger residents, who usually took notes quietly during these evening lecture periods, began to discuss the issue heatedly. David, a young gardener, spoke up: "when people are always coming and going, it's difficult to make connections with people." Alejandro jumped in: "yes, it's not always easy to relate to people that come from all different places in the world–but, take volunteers for example.

They leave, and it's a ripple effect of changes."[266]

Unbeknownst to me at the time, this exchange highlighted a recurrent dynamic at Rancho Bosque: the sudden departure of volunteers and workers. Just one week after I had arrived at Rancho Bosque, the community shrunk from nearly 20 residents to just five; this included an entire cohort of young apprentices, the cook and his wife, a gardening teacher from the coast of Veracruz, and a French volunteer with whom he had begun a romantic relationship. Originally assuming that this departure had indicated the natural cycling of volunteers, I only learned some months later that the nature of the mass "walk out" was unexpected by other leaders in the community. Later, other residents recounted some of the key contentions of the protesters: dissatisfaction with the distribution of income, the amount of hours dedicated to work, and poor communication among community leaders and residents.[267] When questioned later about what had been learned in the process of working in the community, one frustrated volunteer who left during this time wrote to me that "I learned not to trust anyone and that to make *queso fresco*, you need to heat the milk to 37º C."[268] Although these residents were soon replaced with a new group of volunteers and apprentices, I learned later that many of the residents who remained during this difficult time had departed themselves months later, returning to their home towns throughout Mexico or continuing their travels.

Previous research on intentional communities has noted that many communities have relatively limited lifespans, with many communities eventually dissolving or breaking apart as members leave (Valentine 1997). Burke and Arjona (2013) conclude in their discussion of two ecovillage communities in Colombia that "it is premature to treat ecovillages as successes," instead framing such spaces as "experiments in alternative political ecologies,

[266] Field Notes, January 18, 2019.
[267] Field Notes and Personal Communications, May 15–20, 2019.
[268] Personal Communication, Facebook Messenger log, March 13, 2019.

works in progress inspired by imagined possibilities" (2013, 248). Such experiments are not without their challenges, and encounters with resistances; for example, Arjona (in Burke and Arjona 2013) describes her experience of ecovillage communities in Latin America as a process, recounting how projects grew and evolved, changed, and dissolved. I find echoes of these experiences in my encounters with ecovillage communities in Mexico: for seemingly every new community seeking new members or being founded, there seemed to be another that were grappling with high levels of resident turnover, interpersonal conflicts, deaths and illnesses of cared-for beings, or broader financial problems. During fieldwork, two of the communities discussed here faced existential challenges when key founding members left the project abruptly; during the process of writing this dissertation, the other community experienced a similar critical loss. While each of these communities are still in action today, they are already (even before the publication of a dissertation devoted to them) quite different entities than those that I experienced. This experience affirms the difficulties of writing and documenting socioecological assemblages in action.

Although each community consulted for in this research sought to construct and enact new ways of relating–both amongst themselves and with nature–maintaining the systems they had constructed was a challenge that every ecovillage shared. This observation parallels what Jenny Odell observes in the work of writer Robert Houriet, who visited hippie communes throughout the United States in the 1960s: namely, that the project of "seeking the good life" was much easier said than done, and "those who had escaped once were driven to escape again, this time from the commune [itself]" (Odell 2019, 42). In the context of assemblage theory, these tendencies might be due to what DeLanda (2006) calls "relations of exteriority," or the relationships that the components of an assemblage maintain with others beyond the assemblage itself. For Odell (2019), the tendency of communitarian projects to dissolve over time are connected with what political scientist Hannah Arendt calls "the

unpredictability of a plurality of agents," or rather "not so much the reality of exterior circumstances, as of the real human relationships they could not control."[269] In the final section of this chapter, I draw on the forms of death described above to frame ecovillage dispersal as the result of a failure to control more-than-human others.

First, interpersonal conflicts can arise from dissonant perspectives of how to manage life-death entanglements in the community, or even what constitutes "good death" in the first place. As the anecdote of the cats of Aldea Ceiba illustrates, different residents (or groups of residents) can have different understandings of how more-than-human beings "ought to" relate with one another. Paradoxically, these understandings can be rooted in their own sets of partial truths: cats may indeed kill wild birds, but the particularities of context ("*these* cats can't/won't") justify their presence in the community for the purposes of bringing about *other* kinds of "useful" deaths (i.e., rodents or insects). Community decision-making processes and group discussions can uncover contentious topics, creating or exacerbating personal differences.

Unexpected deaths of more-than-human others can also require unexpected shifts in practices or approaches adopted within the community, reflecting interpersonal divisions even more. These events seem to be particularly divisive when they have a negative impact on the financial circumstances of the community. At Tierra Madre, for example, certain crops failed to grow as expected, requiring still greater investments in materials and supplies: more seeds, more plastic sheeting or irrigation tubing, more tools, and eventually, more chemicals to control various *plagas.* In the case of Tierra Madre, crop failures were understood not as the result of complex bundles of multispecies relationships, but were instead interpreted as personal or intellectual failures of the residents charged with their care. As *tomatillos* withered on the vines and flowers (purchased and transported at great expense) withered in

[269] From Arendt's (1998) "The Human Condition," pp. 222.

the ground, tempers flared between residents, who suggested that certain individuals take greater responsibility in their management. Ultimately, these interpersonal conflicts escalated to the point that founding residents left the community entirely.

Absence from the physical bounds of the ecovillage has reverberations through the social fabric of the community, particularly in the ways in which the work of caring for particular beings was distributed. If Patricia and Gonzalo, the primary caretakers of the bees, were away, few others were equipped to perform hive checks and assess their health. For Patricia, an avid traveler, this meant organizing her annual trips to Europe in the rainy season, when the bees were largely conserving their stores of honey. Aldea Ceiba and Rancho Bosque both operated on dividing up the labor between people–if one person left, the absence was felt in terms of the watering duties or taking care of the animals. Plants, especially seedlings, had to be tended to daily to make sure there were regular waterings, and animals needed to be guided from pasture to stable. When several individuals were away, these duties necessarily fell to other residents, or necessitated a recruitment of more volunteers. At times, it even led to the abandonment of projects or cultivated spaces, if no replacement with sufficient knowledge or interest could be found to replace them.

Finally, the failure of more-than-human others to live and die in expected patterns can necessitate drastic shifts in the community's approach to working with more-than-human others, and in some cases the mission of the community itself. Residents who expect to earn a modest income from the sale of products like meat, eggs, honey, or produce must seek out other alternatives when particular plants and animals fail to live (and die) in expected ways. In some cases, residents leave the community itself in order to earn money elsewhere, with the intention of eventually being able to reinvest their earnings in the community.

Those who leave communities often carry away with them particularized kinds of knowledge that are specific to the unique contexts in which they are formed. As discussed

above, even residents and visitors with previous experience in gardening, animal husbandry, and other forms of practice common in ecovillages often must negotiate these skills within the ecological and social contexts of each community. This refers not only to the particular ecological, topographical, and geomorphological characteristics of a site, but also the social relationships that caretakers form with the animals, plants, and insects they care for. Despite my work over several months shadowing the man who cared for Rancho Bosque's sheep, for example, I was nowhere near able to replicate the relationships he had with his sheep and the kinds of offhand knowledge he had collected over years–individual's names, histories of illness, food preferences, and personality. When skilled practitioners leave, this knowledge must be rebuilt–and in many cases, is irrevocably lost.

8.6 Illness and Intervention

My own experience with illness during my fieldwork at Rancho Bosque emphasized how managing and intervening in life-death flows could produce material, embodied consequences. One morning as I cleaned the stables, I was overcome with a wave of nausea and exhaustion and noticed that my right arm was beginning to swell. While some residents noted that the rash beginning to develop looked like a reaction to a plant colloquially known as *mala mujer* (“evil woman”; *Cnidoscolus angustidens*), the question of where my illness originated, and how it could be treated, was largely unknown.

After some days with no improvement, I submitted myself to a consultation with the community doctor, Benicio, at the suggestion of Jens and several other community members. Benicio placed two magnetic disks on my palms and asked me to reflect on the cause of my emotional pain, which he identified without hesitation as the source of my skin ailment. Despite my skepticism, I found myself nodding in genuine agreement as he explained that the mind-body connection could produce ailments that seemingly appeared out of nowhere. After all, I had been stressed trying to build relationships with the other community members and

was exhausted by the intensity of the daily workload–maybe it *was* psychosomatic. While I attempted to observe the encounter from outside myself, my desire to alleviate my symptoms had shifted me out of "researcher" mode and into "patient" mode. Benicio documented the session on a legal pad and asked me about how I was feeling. Was there someone I had wronged? Someone who had wronged me? Despite my exhaustion, I was slightly amused by the self-recognition–the interviewer had become the interviewee. By the end of our session, the itching of the welts had seemed to subside, my arm seemingly deflated. Maybe it was all in my head, I surmised.

Over the next few days, however, my symptoms resurfaced with a vengeance. Large, painful hives the size of tea saucers enveloped every part of my body, disappearing and reappearing in unpredictable ways. My lips and eyelids swelled, then subsided, then swelled again, distorting my features to the point that I elicited gasps from the women I shared a room with. Unable to eat and exhausted, I slept away days on a thin mat on the concrete floors of the communal house. The prospect of going to the hospital was broadly dismissed, as Benicio explained that the doctors would not be able to do much more than treat symptoms–if the real cause of my illness was mental, then the first course of action should be tending to and healing my "energies." Instead of the hospital, I was offered low doses of antihistamine medication that could be administered by injection, and advised to place cold mud on my limbs and expose them to sunlight.

Two days into this reaction, as the debate about whether my condition warranted a trip to the hospital raged on, a sort of "town hall" was convened in the kitchen after the residents had returned from their work in the pastures. When it was my turn to speak, I remarked that I was unsettled by the sudden onset of such mysterious and painful symptoms–scared, even. "Scared? Why would you be scared?" asked a woman who worked in the kitchen. "I mean, I'm scared of death. If this is an allergic reaction, my throat could close. I

could die!" I replied. Jens, largely quiet until that point, spoke up: "this is exactly your problem. Your fear of death is helping the thing that infected you more–whether it is the plant, or your own negative energy."[270] While the conversation ended in a trip to urgent care and eventually, a full recovery, I didn't realize at the time how Jens's remarks would come to influence my roles within the community.

The morning after the last of my hives had subsided, I slipped on my boots for stable work and started up the road with other residents towards the sheep stables. Rodolfo stopped me on the way up: "do you mind if we talk?" We sat at a small round table in the center of the office, shelves filled with maps and binders of paperwork. "We think from today it would be a good idea for you to work in the garden instead," he started. He explained that sheep were uniquely sensitive creatures–not only to the cold temperatures or intestinal parasites, but also to negatively charged energetic flows. The outbreak of my skin reflected what he, Jens, and other residents understood as a profound psychic distress, evidenced even further by its failure to dissipate even after performing the periods of deep meditation they had recommended. "This negative energy that you attracted somehow, you can transmit this to the sheep…well, maybe you already did." He continued that the day I had begun feeling ill after working in the stables, another young sheep and its mother had fallen ill, and later passed away; Alejandro had burned them the next day. "We just can't take any chances," Rodolfo said. I quickly assented, offering that I was happy to take on any role that would serve the community best. "I'll help in whatever way you want!" I assured him, relieved that I was not being asked to leave. "It's not necessarily what *we* want. It's the sheep–it's about what *they* want," he offered. The deaths of the sheep, my mysterious illness, and my failures to treat it "naturally" had become threads in a broader narrative, one which dictated my roles and responsibilities in the community; another data point in the broader experiment of "what

[270] Field Notes, January 25, 2019.

worked" and "what did not."[271]

8.7 Conclusion

This chapter builds an understanding of death as a state of significance constructed by ecovillage residents themselves: depending on the context (whether the organism itself or the manner of its dying), deaths may be good or bad, manageable or unmanageable, predictable or not. As I discuss using examples across multiple ecovillage communities, these understandings vary across communities, and are rooted in broader sustainability narratives and sets of practices.

How ecovillage residents understand death, I argue, reflects underlying understandings of ecological connectivity–ideas about what *should* die to support other beings, and under what circumstances it is interpreted as beneficial for the community. Deaths that were understood to be useful or expected tended to be those that reified aspects of residents' pre-existing understandings of ecological relatedness, or conformed to community values. At Aldea Ceiba, for example, allowing non-native grasses to grow only to cut them back and repurpose it as a mulch reveals how community residents understand the process of social regeneration and plant growth. As Pierre explained to me, the cut grass served several functions for the cultivated perennials in the garden area, including "inviting in" decomposers which in turn facilitated the release of nutrients which helped new plants grow. This cyclical understanding of death and regeneration, evidenced by Pierre's "chop and drop" method, is equally present in Rancho Bosque's cultivation and slaughter of livestock animals for consumption and sale. The difference in each case are the referents themselves (i.e., more-than-human others), and so too the causal links and logical jumps by which community members connect them.

[271] The anecdotes in this section come from personal conversations and field notes recorded January 21–27, 2019.

The examples discussed above reflect how the deaths of more-than-human beings can have both material and immaterial consequences for communities. Illnesses that affect herds, the death of bee colonies, the decline of cultivated garden areas might require communities to change course and alter plans: purchasing food produced elsewhere, searching for other means of financial support, or diverting resources to ameliorating unforeseen problems. Occasionally, this results in or highlights existing conflicts which might lead to the departure of residents or the dissolution of a community, revealing how human relationships within an ecovillage community depend on networked patterns of care, as well as how they are maintained and upheld. In this sense, deaths might reflect gaps between how human residents plan to manage more-than-human lives, and the embodied realities and resistances of other beings. At the same time, more-than-human deaths also generate new kinds of understandings, challenging residents to reckon with deficiencies in their practices of care. In the next chapter, I further explore this liminality between waste, illness, and death on the one hand, and regeneration and new life on the other.

Chapter 9. The Shitscape of Rancho Bosque

In the discussion that follows, I take up an unconventional subject– manure–as a way into understanding the underlying politics of knowledge construction from a distinctly multispecies perspective. As Terreni Brown (2013) observes, the excretion of waste is a function shared by all bodies (and unlike other substances, is not gender-specific [7]). This substance goes by many names (feces, shit, poop, or even "castings")[272] depending on the body producing it, although in this case, manure refers most generally to waste produced by livestock animals. Bodily waste is perhaps one of the most fundamental aspects of biotic life, an artifact representing interactions between life forms.

In this chapter, I use the ecovillage of Rancho Bosque as a venue for exploring how community members think about, manage, and used animal manure in the service of constructing regenerative agricultural spaces. What these practices reveal, I argue, involves stitching together ways of knowing from various sources with personal and anecdotal experiences of place, particularly formed in individual relationships with human and more-than-human others. While ecovillage communities engage with and incorporate elements of various alternative agricultural frameworks, the process of putting into practice particular strategies is rarely straightforward or uncomplicated. Instead, ecovillage residents design repertoires of "best practices" in the field by engaging in a complex politics of knowledge construction as well as disposal. Residents assemble insights from various sources that include other local farmers, scientists, veterinarians, volunteers, and other community residents. As a material that is both mundane and omnipresent in agricultural practice, manure provides fertile ground for exploring the intangibility of knowledge negotiation and

[272] As is the case with worms.

legitimation in material terms.

For the shepherds that work with the livestock of the Rancho Bosque community, navigating the "shitscape" effectively is quite literally a matter of life and death. Manure is a vector around which whole sets of lives and deaths are organized–not only ovine, but vegetal, entomic, and human alike. At the same time, animal waste is also a potential vector of disease, and must be removed from living spaces to maintain hygienic living conditions both in the stable and in the fields. For this reason, much of the care work for livestock animals involves distancing them from the waste they create. In this sense, manure is both an asset and a potential liability, and as such significantly influences how community residents move sheep and other livestock through pasture and stable spaces.

This chapter is structured as follows. I first introduce the research site as a "shitscape," understanding both the context of the ecovillage and its surrounding environs as spaces that have been and continue to be shaped by livestock manure. I explore how pieces of differing knowledge "systems" are interpolated or become relevant in the context of daily interactions with livestock animals. Next, I point out the ways that manure is differently construed as a material object, depending on the contexts, frameworks, and other beings through which it is made "knowable." In doing so, I suggest that these processes of knowledge validation and legitimation are rooted in the sensorial capacities and distinct priorities of the individuals who transliterate these forms of knowledge into practice. These practices of care gradually become sedimented in the environment over time, transforming landscapes and ultimately modes of making sense of interspecies connectedness. In this respect, death, illness, and waste are signals to be interpreted and made sense of, becoming part of the broader narrative of what lives should sustain others.

9.1 Setting the Scene: At Home in the Shitscape

The distinctive landscape of Veracruz, and particularly the area around Rancho

Bosque, have been described in several ways. When the Spanish explorer Hernán Cortés arrived in the region in the early 16th century, he wrote to Holy Roman Emperor Charles V describing it as a land of lush vegetation, remarking on its particular "suitability for raising livestock" (Cortés 1988, in Sluyter 1999). In the early 20th century, when Mexico was one of the largest exporters of coffee in the world, Veracruz was at its epicenter–particularly in the mountainous regions outside its capital, Xalapa-Enríquez (Topik and Wells 1998; Renard 2010). Today, the cloud forests (*bosque de niebla*) in which Rancho Bosque is situated are recognized as one of the most biodiverse and hydrologically rich regions in the country, and one of the most threatened (González-Espinosa et al. 2012).

In keeping with the theme of the chapter, I add a new eponym– "shitscape" (Terreni Brown 2013)–to the pile. In taking up this term, I highlight the role that manure has had (and continues to have) on shaping the landscape of Rancho Bosque. This understanding is transposed from Terreni Brown's (2013) conceptualization of the shitscape in the context of urban environments, where the "collective sanitary apparatus" includes the pipes, septic tanks, and public toilets that make up distributed networks of waste removal infrastructure.[273] Transporting the shitscape to rural, agricultural spaces requires an additional framing of "shit" not only as a waste product that must be removed or transported away somewhere, but as a resource useful for (and widely used in) cultivating productive agroecosystems. Building on work done in previous chapters to situate "landscapes" as dynamic and historically contingent fields of social interactions, this chapter centralizes an often overlooked, but nevertheless vital, material component of spaces shaped by animal agriculture.

Understanding the ecovillage as "shitscape" provides an analytical frame that brings together understandings of place-making and knowledge formation through its material and

[273] I am also indebted to Dr. Guntra Aistara for inspiring the use of this term in reviewing an early draft of this chapter.

metaphorical associations. Gosden and Head (1994) observe that the concept of "landscape" is imbued with both "fullness" and "ambiguity," a duality that renders it useful for bringing together both physical and conceptual renderings of the same space. In a similar sense, the concept of "shitscape" calls attention to the physicality of manure and the possibility of rendering it legible as a cartographic object, but also as the media comprising articulations between social actors. Anthropologist Arjun Appadurai (1990) notably operationalized the suffix "-scape" to gesture to the "fluid and irregular ways" that worlds are conceptually organized and dispersed, offering examples of "mediascapes," "ideoscapes," or "financescapes" as starting points for understanding how the local and global spheres are stitched together. As Appadurai (1990) makes clear, however, the building blocks of these "imagined worlds" are fundamentally experienced and assembled by individual actors (589). In other words, the shitscape looks different from the partial perspectives of the living beings that occupy it, and the contexts in which they are situated change the ways that manure might be produced, encountered, avoided, or utilized within the community (Figure 16).

The shitscape might not only be rendered as a flat social network, but as a hot, active compost pile, where layers of knowledge mingle and (de)compose together. This perspective is informed by emergent feminist and environmental humanist discourses (Abrahamsson and Bertoni 2014; Lyons 2016; Hamilton and Neimanis 2018; Jones 2019) that understand "compost" as a material metaphor for how new understandings come into being from the nutritive substrate of disciplinary dialogues. Much of this work builds on Donna Haraway's (2016) understanding of compost as a heuristic device for narrating the Anthropocene, revealing how "life and death, human and more-than-human others, are already co-constitutive" (Jones 2019, 7; see also Lyons 2020). Abrahamsson and Bertoni's (2014) ethnographic attention to composting[274] bins further reveals that effective composting does

[274] Specifically, vermicomposting.

not only imply a "forced co-presence," nor "is it about containment of spatial proximity" (128-129); instead, this process amounts to "a precarious composition of different, yet potentially converging, activities and processes" (129). Framing knowledge construction as a process of "composting" requires attention to the kinds of things that are added to the pile–to notice "not only what is being transmogrified, but also under what conditions, why, and to what effect" (Hamilton and Neimanis 2018).

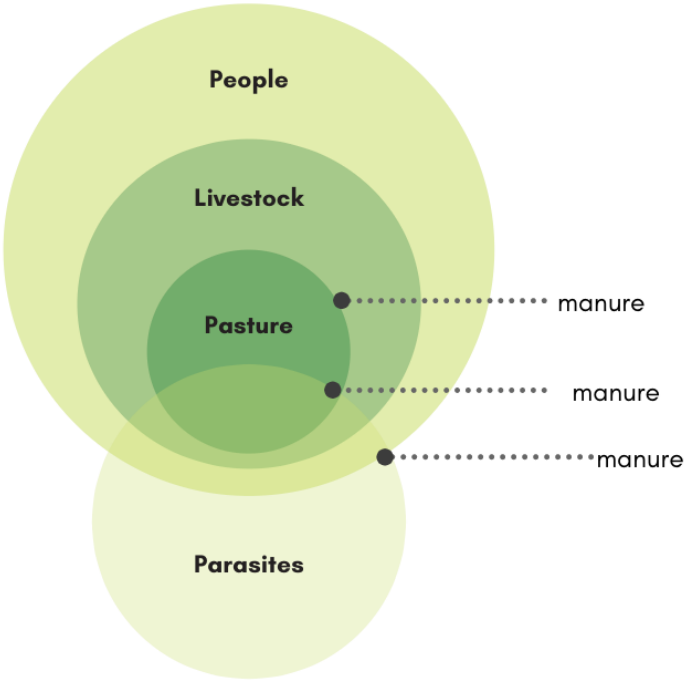


Figure 16. As a material, manure renders traceable the overlapping relationships between multiple fields of actors.

While there is nothing uncommon about the use of animal manure in agricultural settings, in the case of Rancho Bosque, also helps reveal the sustainability narratives that underpin community practices. For example, Rancho Bosque emphasized that all the manure and composts applied in the fields and the gardens were produced by their own livestock to create a closed-loop system. The production of manure was one of the key ways that Rancho Bosque residents justified and explained their care of livestock animals: "the soil is so

degraded here, the old forest soils I mean, so we can't heal them with kitchen wastes and composts alone," explained Francisco, a community math teacher and livestock rotation planner.[275] Because manure could "activate" compost piles with decomposer bacteria quickly, and the problem with soil fertility was an urgent issue, Francisco explained, it followed that raising livestock was an essential component for soil conservation and reconstitution.

Manure is also useful to examine how processes of knowledge construction become embedded in and filtered through more-than-human entities. Rather than an inert material, manure is a trait that on both spatial and metaphorical registers. Manure becomes usable and valuable (or alternatively, unhygienic, or potentially dangerous) depending on the physical context in which it is encountered–whether in stables, fields, or laboratories. These understandings, in turn, shape the ways that shepherds understand the health of the animals they care for, as well as the ways that they might intervene. In learning to "read" manure, ecovillage residents and shepherds assemble scraps from various knowledge systems (rational [*racional*] grazing and biodynamic agriculture, for example), compiling these with anecdotal experience, expert advice, collaborations and conversations with others, and their observations and knowledge about other species involved in the manure-animal relationship. In this way, ecovillagers compose from diverse sources of knowledge according to what "makes sense" in place, "cultivating an aesthetic" (Despret and Meuret 2016, 30) of practice in ways that resonate with the lives and deaths of the animals they care for.

9.2 Tracing Connections: An Ecological History of Manure

The manure of livestock is, ecologically speaking, a relatively new substance in the landscapes of Veracruz. Livestock animals were first introduced during the Spanish

[275] Interview with Francisco, February 24, 2019.

colonization of Mexico through the port of Veracruz in the early 16th century (Sluyter 1996; González-Montagut 1999). As Melville (1994) argues, the "ungulate irruption"–the sudden introduction and subsequent population boom of hoofed herbivores during the earliest period of Spanish colonialism–transformed the Mexican landscape in a manner of decades as forest land was converted to pastures for intensive grazing (González-Montagut 1999). This landscape change not only impacted the presence of biodiversity, but also effectively redrew existing forest boundaries (Barrera-Bassols 1992). González-Montagut (1999) explains that this landscape change has not been steady and gradual since the Spanish arrival, but instead dramatic and fairly recent: the state's forests were reduced by nearly 60% from the mid 1970s-1980s.[276] Today, the care of livestock constitutes the primary economic sector of the state (Barrera-Bassols 1992; Huerta Crespo 2016), with nearly 50% of the total land area devoted to the practice (Barrera-Bassols and Rodríguez 1993; González-Montagut 1999).

Arriving at and walking through the landscapes of Rancho Bosque, this drastic history of landscape change is not readily visible. The winding roads leaving the city of Xalapa, the region's capital, are hemmed in by tall green trees, limbs draped in air plants and bromeliads. A patchwork of individual plots filled with mature coffee plants follows the highway for kilometers, the waxy, forest-green leaves and bright red berries forming a continuous understory below the forest canopy. Even from the view of the stable on one of the highest hilltops in Rancho Bosque, walls of dark green vegetation seem to spring up vertically from the pastures' edges, interrupting the open sightlines across the rolling grassy knolls below. The surrounding greenery leaves the unmistakable impression of being surrounded by the forest on all sides.

On closer inspection, however, the effects of introducing livestock and their manure

[276] See also Barrera Bassols (1992), who notes that Veracruz' forests were estimated at 2,600,000 hectares in 1976, and were reduced to 800,000 by 1983.

are still visible in the kinds of interspecies relationships that continue to play out in Rancho Bosque's pastures. The landscape of Rancho Bosque is deeply shaped by the lifeways of livestock, and has grown up in relation to their movements through these spaces. Sheep, in particular, are picky eaters, and pasture spaces must be continuously cleared of woody vegetation (shrubs and young trees, for example) to create space for the grasses they graze on. As Despret and Meuret (2016) write, "the memory of the flock, in some ways, gives to the land a part of its existence. By the concrete memory of the mouths, the eyes, the guts, the bodies, the legs, and the feet, the flock multiplies the ways lands, paths, bushes, springs, and rocks exist" (33). The manure livestock leave in the fields behind them become fodder for insects like dung beetles (*Coleoptera: Scarabaeinae*) that burrow, eat, and reproduce in livestock manure (particularly large manure pats, such as those left by cattle). The movements of livestock and the manure they deposit also attract other insects like ticks (*garrapatas*) fleas, and flies, which in turn serve as food sources for the cattle egret (*Bubulcus ibis*), which follow livestock through pastures often perched on their back.

The warp and weft of these interspecies relationships defy neat categorizations like "native" and "non-native" (Cattelino 2017), challenging notions of what "belongs" in healthy agroecosystems and what does not. Some grasses, including *pasto estrella* ("star grass," or *Cynodon spp,*) were introduced from Africa and are now naturalized throughout Mexico[277] , promoted for their suitability as drought-tolerant forage for livestock and as a suitable component of more "sustainable" agrosilvopastoral systems (Nahed Toral et al. 2015, Rojas-Sandoval 2020). The establishment of year-round pastures[278] influence the biodiversity of endemic insects, such as dung beetle species; for instance, Halffter and Arellano (2002) note a greater presence of Scarabaeinae species in the region of Veracruz that are adapted to "open

[277] Villaseñor and Espinosa-Garcia (2004).
[278] This is in contrast to the swidden agriculture that was practiced by pre-Hispanic populations (see Halffter and Arellano 2002).

spaces," compared to species adapted to the shade of a forested canopy which are now less frequently observed. Cattle egrets (*Bubulcus ibis*) themselves are natives of Western Africa, arriving in Mexico as late as the early 1950s, presumably after migrating across the Atlantic Ocean to the Americas in the late 19th century (Arendt 1988, Massa et al. 2014). Taken together, these relationships reflect a dynamic process of landscape change, a bricolage of ecological relationships instigated (and in turn, normalized) by the prevalence of intensive livestock ranching.

This "naturalization" (in both ecological and social terms) is perhaps best evidenced by the unquestioned presence of various livestock species themselves within agroecosystems. Of the kinds of animals present at Rancho Bosque–including chicken, cattle, pigs, sheep, and goats–only *jabalí* (peccary) originated in the Americas. On my first visit to the community, Rodolfo had gestured towards the pastures on our tour, declaring that "without animals, we couldn't do any of this," referring to the usefulness of manure in "regenerating" the soils of degraded pasture land.[279] While the introduction of livestock animals in Mexico has often been framed in terms of ecological consequences, including soil erosion, deforestation, and loss of endemic biodiversity (Melville 1994, González-Montagut 1999), at Rancho Bosque[280] animal agriculture is also framed as part of the solution. With the acknowledgement that livestock and the products they provide (meat, milk, and of course manure) represent opportunities for sustainable economic development (Nahed Toral et al. 2015),[281] broader development agendas (and discourses among farmers) have shifted to doing animal agriculture the "right way." In this way, manure itself seems to have been naturalized as a component of Veracruz agroecosystems.

[279] See chapter 4 for further discussion.
[280] Two other communities in the region adopted similar models for community-based production of food.
[281] This was also expressed by interlocutors at Rancho Bosque.

9.3 Manure as Medium: How Ecovillages Manage Waste

The Rancho Bosque community relies on a number of measures for managing and processing bodily waste. Communal bunk houses are fitted with conventional flushing toilets connected to a "*biodigestor*," a system of receptacles that generates biogas for energy production. Elsewhere in the pastures, dual composting toilets separate liquid from solid waste, which is continuously layered with organic matter and can be used as a soil amendment or fertilizer for fruiting trees and shrubs. Rancho Bosque emphasized the use of detailed documentation and record-keeping in their agricultural practice, and the management of the waste of its residents was no exception. One of the first details arriving visitors might notice upon settling into communal housing was a detailed spreadsheet taped above each flush toilet, and a small pen attached with string. "*Estimado usuario* (dear user)," the document read, "every time you visit the bathroom, please register the completed action," encouraging visitors to document the date and estimated amount (in mL or g) of the waste deposited in order to evaluate impacts on the *biodigestor* tanks below. Although the system was abandoned almost as quickly as it was adopted (owing to a general sense that the request was an undue invasion of privacy), the document represented the importance the community placed on accounting for the production of bodily waste in many forms.

Much of the daily work carried out at Rancho Bosque, whether working with livestock or in the garden, also revolved around the treatment and management of manure. Every morning, the compost piles were "woken up" by removing the plastic tarps that covered them in the evening: "giving the microorganisms room to breathe," Antonio told me. While most of the project's animals spend their days in pastures, in the evening they are moved back to their stables and paddocks for the evening. Livestock leave waste in both the pasture and the stables, the latter which must be cleaned on a daily basis. Every few days, manure that had collected on the slopes beneath the elevated stable floors was swept together

and collected in piles at the upper edge of the terraced garden spaces. Periodically, this manure is then relocated to a central space on the upper slopes, where it is mixed together with waste from other animals and other organic matter in compost piles. Later, this finished compost is then redistributed to other garden spaces and orchards throughout the property.

Image 22. Artwork on the *baños secos* ("dry" or composting toilets) at both Rancho Bosque (left) and Aldea Ceiba (right). On the right, instructions advise users of the correct way to use the composting toilets, including adding a mixture of sawdust and organic material afterward.

Although the management of manure is an activity central to agricultural practice, its potentiality as both a harmful and generative substance varies depending upon the agroecological contexts in which it is a component. In industrialized agriculture settings in Mexico, which are characterized by herds that are both larger and more compact, manure might be spread *en masse* over fields as a form of fertilizer. In certain respects, this practice is not necessarily seen to be "environmentally friendly," as "off gassing" from spread manure is framed as a greenhouse gas and a contributor to climate change (Gonzalez-Avalos and Ruiz-Suarez, 2001; Pratt, 2019). In the context of smallholder agriculture, however, this practice was framed as less problematic as leaving manure in piles in fields temporarily inhibits the growth of grasses and enhances the suitability of the surrounding area for grazing.[282] In this context, dispersing manure (as an alternative to collecting and processing as compost) was interpreted by the shepherds I worked with as *more* environmentally friendly, in part because it allows ranchers to use lands more efficiently, "doing more with less" (in the sense that livestock can be returned to previously grazed areas more quickly).

The agricultural strategies employed by Rancho Bosque are explicitly framed as alternatives to the forms of intensive ranching that are predominant in the region. The strategies they employ are compiled from various sources and "kinds" of alternative agriculture; namely, including silvo-agro-pastoralism (*silvoagropastoreo*), "rotational grazing" (*pastoreo racional*), and biodynamic agriculture (discussed in greater detail in the introduction). Silvo-agro-pastoralism refers to the balancing of forest management (silviculture), crop cultivation (agriculture), and pastured livestock as part of an integrated system. While the term indeed suggests kinds of practices (for example, using forests as "living fences" or providing shade for livestock in pastured spaces), it more often gestures to a broad suite of possible approaches to maintaining "balances" between each of the system

[282] February 22, 2019.

components. In the case of Rancho Bosque, this approach is specifically accomplished *through* the practice of "rotational grazing" (*pastoreo racional*, or alternatively PRV [*pastoreo racional Voisin*]). In such a system, pasture spaces are divided into smaller parcels or subdivisions through which livestock are periodically rotated in deliberate and calculated ways. The key principle of Voisin's method was that livestock occupy parcels for shorter periods and at a particular stage in the growth of grass, to provide the grazing animal with optimal nutrition while also preserving the ability of the grass to regrow. Finally, some approaches derived from biodynamic agriculture also inform Rancho Bosque's practices, (discussed in greater detail below). While in some cases there is significant overlap between these fields of approaches in terms of the specific practices employed–for example, eschewing the use of chemical fertilizers. However, each of these approaches also have distinct intellectual legacies and associations that differentiate them from the others.

Rotation of animals and plants through community space is a fundamental practice to the strategies adopted by Rancho Bosque residents, relying on an orchestral coordination of different lifeways, feeding habits, and growth patterns. The rate at which different kinds of livestock are rotated depends greatly on the kind of species: ruminant animals (cows, goats, and sheep) are rotated to new pasture areas every morning, pigs and wild boars occupy parcels for much longer. This is in part due to the dietary preferences and feeding styles of different species–for example, while pigs root in the soil, eating tubers and roots, ruminant species prefer different kinds of grass and vegetation at different stages of growth. These relationships are articulated by Voisin's (1988) discussion of the rational grazing strategy in his work "Grass Productivity," in which he framed the act of "grazing" as a meeting between animal[283] and grass at certain moments in the life cycle of each creature (42).[284]

[283] Voisin's work focuses specifically on cows.
[284] Voisin also advocated for interdisciplinarity, urging collaborations between "botanists and animal experts to meet and fill in the gap separating the two sciences."

These movements are tracked carefully by residents of the community. Residents are assigned daily tasks around the care of particular species, where they may stay for a period of several weeks or months before being "rotated" themselves to the care of other spaces or other beings. Residents are each encouraged to keep log notebooks, detailing their general observations about the health and wellbeing of the animals they care for, as well as notable events (births and deaths, as well as dates of sale or slaughter). The key purpose of these notebooks is also to track the dates on which animals are moved into parcels that are assigned alphanumeric codes, and the length of time that they remain in these areas. The Rancho Bosque landscape is marked by the permanent infrastructure that is necessary to maintain these rotative patterns–barriers are constituted by a system of electrified fences (*cercos electricos*), some of which are movable and adjustable (*malla*), and others which are more permanent (concrete posts and fencing). On the edges of the pasture space, these electrified fences mark the boundaries where the forest begins, preventing livestock from nibbling at the dense growth just beyond the fence.

Manure is a key substance that influences these rotational patterns within the pasture area, in that it constitutes a nexus of interspecies relationships that can render either harm or benefit to livestock that remain in its vicinity. Left in fields, manure can serve as a nutritive substrate for the grasses, shrubs, and trees that Rancho Bosque animals graze on. At the same time, separating animals from the waste they create is necessary to reduce the possibility that vectors for disease might be passed from one animal in a herd to another. When ruminant animals deposit manure in fields, they also deposit the larvae of intestinal parasites and other microbes that thrive in the guts of livestock animals and make them ill. Because the larvae of these parasites can develop in short periods and transfer themselves to new vegetation, they can be re-ingested by (and hence, reinfect) the animals that deposit them (Huerta Crespo and Cruz Rosales 2016, Whittier et al. 2009).

While rotation of animals and removal of manure are broad strategies that apply generally to many livestock species, the possibility for poor health outcomes (including type of illness and potentiality of transmission) depends greatly on the species in question. For example, lactating cows commonly suffer from a condition called *mastitis*,[285] an infection of the mammary glands caused by different types of coliform bacteria (some of which are resistant to attempts to sterilize their quarters or milking equipment [Eberhart 1984, Smith et al. 1997]). Sheep, on the other hand, are particularly sensitive to intestinal parasites like the barber pole worm (*Haemonchus contortus*, discussed below), which can cause lethargy, anemia, and a wasting death. Caring for livestock in the context of integrated agroecosystems involves not only a broad understanding of the role manure plays in establishing and maintaining various animate mobilities, but also involves specific attention to the relationships animals have with their own manure, as well as the particular kinds of risks that these fields of relationships imply.

9.4 Manure as Metaphor: Thinking Through Alternative Agricultures

Practicing alternative forms of agriculture is not only a matter of using manure differently as a material, but also involves thinking through manure differently. Manure is a material rife with associations of both life and death, decay and regeneration, and as such lends itself well to understandings of the environment that emphasize "closed loop" systems, a common feature of regenerative agricultural systems whereby "waste" or "byproducts" are repurposed into valuable material. Ecovillage communities in particular are founded with the specific goal of reworking residents' relationships with the processes and material consequences of consumption and waste (Kasper 2008, Ergas 2010, Sherry 2019). "Produce

[285] This condition is quite costly to the dairy industry, as it greatly reduces the quality of milk (resembling a light-yellow pus)

No Waste" is one of the core principles of permaculture, a framework of sustainable design that has been popularized in ecovillage settings. While some communities set the explicit goal of becoming "zero waste," this principle refers not only to the goal of waste reduction or elimination, but also encourages an understanding of "waste as a resource."[286] In this respect, the repurposing of excrement (including livestock *and* human) for the generation of energy, soil amendments,[287] and producing composts becomes a way for communities to perform sustainability in their daily practices.

Manure provides a material substrate in which to root these wider negotiations between different ways of knowing. As discussed above, Rancho Bosque residents draw on various forms of agricultural knowledge systems articulated in other places to compile new forms of practice tailored to the contexts of their daily work. Residents shift between these various ways of knowing and describing depending on the contexts in which they must apply them. For example, many long-term residents with positions that involved higher-level management (including monitoring product sales, planning and tracking crop rotations, and external grants) tended to use language that emphasized the quantifiable aspects of their practice. In this context, "*agrosilvopastoreo*" was framed as an equation composed of distinct variables–the number of animals in a herd, the rate at which grass regrows, and available pasture space in square meters, expressed in terms of calendar days needed for the herd to make a full rotation through the field. A handout prepared for a class of visiting veterinary students at Rancho Bosque summarized part of their approach thusly:

[286] "Ecovillages as a Model of Practiced Sustainability," Global Ecovillage Network
[287] In some communities, urine is also deliberately repurposed as a soil amendment due to its high nitrogen content

> THIRD LAW OF RANCHING:[288] disperse manure after an animal leaves the pasture subdivision!... If you do not disperse the manure piles, the animal will avoid those places for a period of two to three months because of the odors that emanate from them... in extreme cases, this [avoidance can last] up to one year! Each pile of [cow] manure occupies approximately .09 meters squared x 10 defecations x 100 cows x an area 10 times greater than the area that will be rejected x 3 times a year... in other words, you lose approximately one-third of the productive capacity of your land by not dispersing manure.[289]

Together, *agrosilvopastoreo* and *pastoreo racional* (rational grazing) provided the language to frame this method of ranching as "more efficient" than conventional practices or livestock care more prevalent in the region. By using shorter, controlled rotations of livestock, residents of Rancho Bosque–particularly community leaders who were tasked with presenting the community to outside visitors–were able to communicate how they accomplished two goals at once, "maximizing production while minimizing impacts on the environment."[290]

This mode of explanation–of livestock, pasture grass, gardens, and cloud forest as components of a balanced, regenerating system–also seemed to correspond neatly with the narratives of "best practices" advanced by regional policymakers and international development organizations, reflecting Jens' experience implementing rural development programs. In particular, *pastoreo racional* is a strategy that has been promoted in joint efforts between local ecologists and biologists at the Institute of Ecology in Veracruz as well as local ranchers to establish strategies for "*ganadería sustentable*" (sustainable ranching). Rational grazing is framed as a strategy with mutual benefits for nature and the rancher through the dual possibilities that manure provides–first, revitalizing the soil through the incorporation of organic material, and second, because it replaces the use of expensive agrochemicals

[288] This may be an indirect reference to Voisin, who also used the language of ranching "laws" (see Voisin 1988).
[289] Soil Handout, Rancho Bosque [*n.d.*], received February 4, 2019.
[290] Interview with Jens, February 11, 2019.

(including herbicides and pesticides) with a free and readily available material.[291] Additionally, the rational grazing system and its emphasis on cycles–of livestock through fields, but also of waste product to resource–maps onto criteria set by an external funding agency that partially finances programming at Rancho Bosque for sustainable development. These goals are, namely, to promote "self-sufficiency for small scale farmers" and creating "sustainable economic independence" through the creative use of existing resources.[292] In documents and media prepared for external parties–including visiting university classes, funding agencies, or partner institutions–aspects that highlighted both economic independence and positive environmental impacts were particularly emphasized. Soil (and by extension, manure) became the primary physical medium through which these two components were simultaneously addressed.

In contrast to these more technical modes of describing their agricultural strategies, residents also referred often to principles of biodynamic agriculture in conceptualizing the agroecosystems within the community. Biodynamic agriculture does not just comprise a toolbox of specific practices or modes of problem-solving, but rather promotes a particular way of thinking archetypally to synthesize and reproduce knowledge about the natural world. For example, the idea of "the farm as a living organism" provides an adaptable metaphor for understanding interrelations in an agroecosystem: the livestock animals perhaps representing different organs, each contributing complementary functions to a common purpose or entity. As seen in a handout from the Biodynamic Conference of the Americas, plants might be classified as "monocots" or "legumes," but also associated with elements ("air," "fire," "earth"), organs, chemical elements, planets. Associations with different entities give biodynamic practitioners a way to "think through" relationships between different plants by

[291] See "Ganadería Sustentable en el Golfo de México [Sustainable Ranching in the Gulf of Mexico," in particular Arellano et al. (2018) and Castillo (2018).
[292] GLS Treuhand document, https://www.zukunftsstiftung-entwicklung.de/vererben/aktuelles/aktuelles/mexiko-baufortschritt-bei-Rancho. Accessed July 15, 2021.

thinking about how each "balances the other."

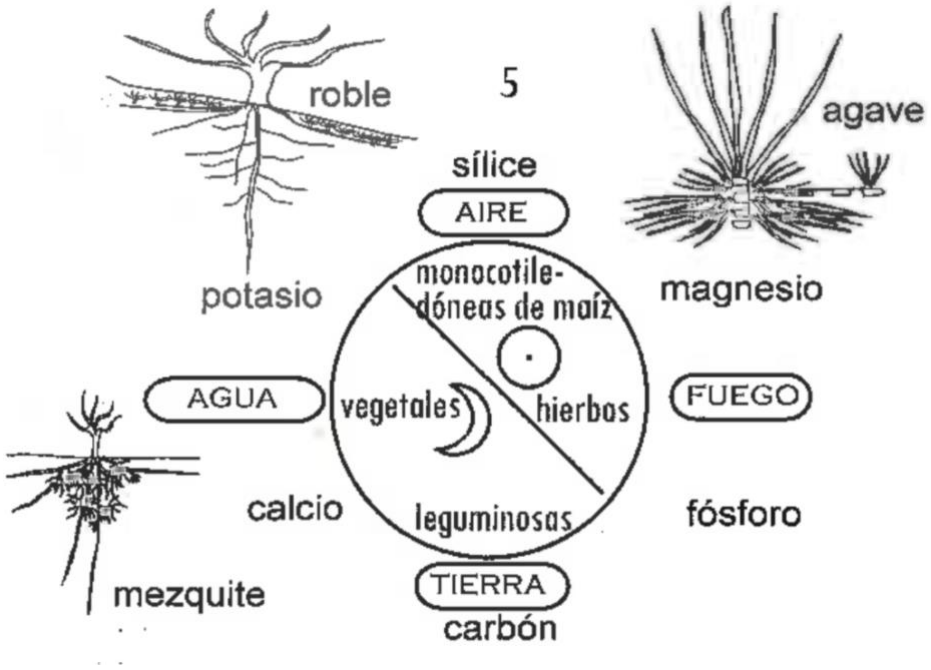


Image 23. Handout from the Biodynamic Conference of the Americas, 2019. The diagram represents how different plants are associated with different combinations of properties (*agave*, for example, is a mix of "*aire*" (air) and "*fuego*" (fire).

The principles and attendant language of biodynamic agriculture very much influenced the spirit and tone of Rancho Bosque community life. In evening lectures held in the *Aula* (classroom), some residents spoke passionately about the philosophy of Rudolf Steiner[293] and the tenets of biodynamic agriculture, lecturing on energetic exchanges between astral and mineral planes, or the power of maintaining good intentions in carrying out daily work activities. In one of these lectures,[294] Antonio described the underlying philosophy of biodynamic agriculture, Anthroposophy, as "a form of life, and a form of thinking as well... Steiner... he was more focused on teaching people how to develop the imaginative part of the brain... how the imagination is a way of thinking, a point of view about things that are not so...so quantifiable, but *ahí están* (they're there)." The purpose of many of these evening

[293] Rudolf Steiner, the founder of the anthroposophy movement in Central Europe and the first elaborator of the biodynamic agriculture method.
[294] Classroom Lecture, February 18, 2019.

chats, which drew on themes from anthroposophy and biodynamic agriculture ("'*bio*' is life, and '*dinamica*' is force," explained Antonio), was to instill in residents a sense of the sensorial and intuitive qualities of agricultural work, teaching fellow residents "how to become observers," both of themselves and their relationships with other life forms.[295]

Manure, as it happens, is also a central material in both the theory and practice of biodynamic agriculture. The lecture series that gave rise to the elaboration of the system of biodynamic agriculture arose primarily as a response to farmers' observations that their soils were becoming progressively degraded with each harvest. Steiner saw the root of this problem as replacement of "natural" fertilizers (specifically, the manure of livestock) with chemical fertilizers in a misguided attempt to increase productivity. Steiner describes the usefulness of manure in his fourth lecture on agriculture,[296] which he describes as a material permeated with energy, which "gave occasion for the development of dynamic forces" within the organism that excretes it. In the lecture, Steiner describes a practice that has since become a foundational practice in biodynamic agriculture known as "Preparation 500," whereby a cow horn is packed with manure, buried in loose soil and left over the winter, then excavated and applied to fields before planting next spring. By preparing this concoction and "giving it over to the earth," reasons Steiner, "what we are actually doing is to give the earth something ethereal and astral which has its existence by rights, inside the belly of the animal." This understanding of manure is one of a substance imbued with vital and dynamic forces because of its production by living beings: "permeated with ethereal contents from the interior of organs, out in the open" (Steiner 1924).

This surprisingly romantic framing of animal feces reflects an understanding of

[295] Interview, Rodolfo, January 12, 2019.
[296] Now known as "The Agricultural Course" by archivists of Steiner's work, and which has served as the basis for current principles advocated by organizations like the Biodynamics Association and the Demeter brand certification, Preparation 500 is a preparation for crops that involves packing a cow's horn with manure and burying it over the winter, a practice that is distinctive to biodynamic agriculture.

livestock as beings involved in complex energetic exchanges, both terrestrial and ecological, as well as cosmic and celestial. The emphasis on encountering the world through imagination invites practitioners to bring attentiveness to the lifeworlds of other beings, and their ongoing entanglements in energetic fields from various sources. Sometimes, this may even be too close for comfort; as Steiner writes of livestock, "if you could crawl about inside the living body of a cow…if you were there inside the belly of the cow you would *smell* how the astral life and the living vitality pours inward."[297]

Months after leaving Rancho Bosque, I reunited with many residents at the Festival de Agricultura Biodinámica de Las Américas (Biodynamic Agriculture Festival of the Americas)[298] in Guanajuato, where they had traveled over 7 hours by bus to connect and learn from other biodynamic agriculture practitioners from throughout Mexico, the United States, and beyond. There, I encountered one such "imaginative picture" that I had become deeply familiar with during my time working at Rancho Bosque: the digestive system of a ruminant animal. The keynote speaker of the conference explained how, through imaginative thinking, farmers could deduce medicinal remedies through close observation of livestock. He continued with an example of a cow with digestive issues, where things might "flow" a little too easily. Treatment for this issue, he explained, began by bringing attention to the needs of the cow through targeted questioning ("does my cow need water? No, she's been in the field for days eating the fresh grass"), and further, by considering plants that could correct this balance. "So, I get the alfalfa, which I've learned pulls things down, but not wet, dry..." Balancing the gut of the cow, the speaker explained, was a microcosm of a broader balancing act of polarized forces or energies: heavy and light, wet and dry, cold and hot.

This example of biodynamic discourse illustrates how these practices reflect deeper

[297] Lecture 4, Steiner (1924).
[298] Held in San Miguel de Allende in September 2019.

ontological assumptions about the relationship between humans and the natural world– namely, the power to deduce relationships between other beings through observation and cultivated intuition. As the speaker elaborated on the gut of the cow, he explained that his approach to "imagining balance" was "a picture of this great harmony that is present everywhere in the natural world. And it's an imaginative picture, it's a magical picture, but it's also very exact in terms of science. Those two things are not exclusive."[299] This conclusion echoed similar sentiments in Rancho Bosque's evening meetings, during which residents advocated strongly for "other ways of knowing." Benicio, the community's resident psychologist and medical personnel, related in one evening lecture how biodynamic approaches shaped his personal transformation from an "egoist, Western" doctor who worked in a conventional hospital to a more "enlightened person":

> I thought with the knowledge I had I could cure the world…but this was challenged when I had a patient that I realized I could not help. I could not cure him. When you're closed, the universe realizes (*da cuenta*). But, when you're open, the universe takes it into account...
>
> Everything is energy, we are all producing it all the time, both positive and negative. Even when we are born, we receive an electric shock that allows our heart to start, for us to grow...this is why we must be more sensitive, more conscious when we kill (*sacrificar*) an animal. Not only thinking, "oh, it's to eat it." This is what we can learn from biodynamic agriculture…we have other forms of knowledge. We have scientific knowledge, yes. But shamanism, it works. Witchcraft, it works. There are other ways.[300]

For many residents of Rancho Bosque, these shifts in tonal and linguistic registers in describing their agricultural practices were not considered to be a contradiction of terms. Instead, navigating these different systems became a method for exploring and making sense of the relationships between discrete spaces in the community (forest, pasture, and garden) and the beings that inhabited them. Manure could be known both through quantification and

[299] Biodynamic Festival of the Americas, September 20, 2019.
[300] Evening Lecture, January 16, 2019 (Field Notes and Recording).

measurements and pasture rotations, just as it could through attuned observation and critical reflection.

In the sections that follow, I sketch out the contours of Rancho Bosque's "shitscape" by bringing attention to the places where manure is made out to be a material that invites further study. In particular, I highlight the ways that agricultural knowledge is produced and negotiated in relation to waste by focusing on the experiences of one of my interlocutors, a shepherd whom I call Alejandro, and his care of Rancho Bosque's sheep flock.

9.5 In the Stable: Personal and Affective Experiences with Sheep

My first direct encounter with the animals of Rancho Bosque took place nearly a month after I first arrived at the community. There were two main reasons for this, as the young man in charge of organizing the *ganaderia* (ranch) told me–both framed around my own sensibilities. The first reason, he explained, was that the sheep were sensitive animals, and managing them–from guiding them from the stable to the pastures to administering anti-parasite treatments–required a sort of placid fortitude. "It requires having the right kind of energy," Rodolfo, one of the planners of the agricultural spaces, told me simply.[301] The second reason was that initially, the community had assumed I didn't have an interest in the first place. I was a vegetarian, and therefore Rodolfo imagined that I probably wouldn't want to be exposed to the grim realities of animal care. "A lot of vegetarians can't handle the sound an animal makes when it touches the electrical fencing," he reasoned, much less seeing an animal killed and butchered.[302] After several weeks working in different areas of the community and professing my interest, I was "rotated in" to a position working in the stables, alongside Alejandro, the shepherd charged with caring for the sheep.

[301] Field Notes, January 2, 2019.
[302] *Ibid.*

Alejandro was a young man who had studied agricultural science at the university level elsewhere in Central America,[303] and initially came to Rancho Bosque as part of a work-study program. The brief trip turned into an extended stay, and he later came to live as a longer-term resident at Rancho Bosque at the invitation of another resident, a friend he had grown up with years before in his home country. His day began by letting the sheep out of their stables, where they spent every evening unless the weather was exceptionally good. He and Marci, the community's dog, would lead the sheep to the portion of the pasture that they had planned next in the rotation. The sheep spent every day in a new location in the hilly pastures, cordoned off by movable electrical fences. This meant that Alejandro spent a good deal of time manipulating the electrified *malla* (net-like fencing), opening and enclosing pasture spaces in a way that moved sheep from parcel to parcel to "fresh" grass each morning. Like other residents who worked with the community's animals, he also monitored the health of the flock in a notebook, attending to births, illnesses, and deaths.

As a newcomer to caring for livestock (and sheep specifically), shadowing Alejandro was a crash course in learning the necessary practical and affective skills for caring for sheep. Some of these bits of knowledge were inherently situational–where to find tools for cutting *pasto* (grass), how much sea salt to add as a supplement to feed, where and how to gather water, and how much *cal* (lime) to spread as a disinfectant on stable floors. It was also necessary to learn how to approach sheep the right way–calmly, deliberately, and with "good vibes (*buenas vibras*)" Rodolfo told me. He emphasized that my ability to work in the stables was conditional on being able to build a relationship with the flock, and that animals are more susceptible to disease when they are stressed; therefore, this process was just as much about them getting to know me as it was the other way around. While occasionally I helped Alejandro move the sheep from the stables on the highest hilltop to the pastures below, this

[303] Identifying details are deliberately obscured.

was a task that Katu was more skilled at performing. Instead, my primary tasks consisted mostly of working in the stables with manure.

Managing and moving manure is a form of work characterized by a deep intimacy with other animals and their bodily waste. Cleaning stables is a repetitive, Sisyphean task; while it must be done on a constant basis, a well-done job will necessarily be undone over the course of a night, when the process must begin again from the start. A particularly perilous task involved the collection and removal of manure on the first level of the stables while the sheep occupied the pens above; moving quickly and watching sheep movements was imperative to prevent unexpected surprises from falling on my head through the slatted floorboards above. After a week of working in the stables, I wrote in my field journal of the "surprising revelations" of the stable cleaning process–spending hours at a time considering the consistency, contents, and texture of sheep manure.[304] As other shepherds related to me, close attention to manure can yield information that may not be readily apparent through other means: the quality of nutrition, disease, or the presence of parasites. Manure of healthier sheep is sufficiently dry and sticks to stray pieces of dried grass (*pasto estrella*),[305] allowing it to be rolled like a mat and quickly disposed of. The manure of ill or anemic sheep, on the other hand, is overly liquid, adhering like wooden planks of the stable floor like glue. In this way, cleaning stables made sheep health into a material that could be felt in the level of effort necessary to accomplish the task.

While sheep share some similarities to other ruminant animals, some features of their care are specific to individual animals. As multiple residents who work with the animals of Rancho Bosque confirmed, sheep are "more sensitive" to the surrounding environment, including exposure to wind, rain, or cold temperatures, as well as to other beings (namely,

[304] Field Notes, January 9, 2019.
[305] *Cynodon nlemfuensis* (African Bermuda-grass)

parasites and humans). To the uninitiated shepherd, sheep might appear rather placid and inexpressive, apart from the occasional *baa*; while young lambs are curious about newcomers to the stable, adults can appear more wary, calling out when separated from the group for routine health checks. However, watching sheep movements closely can signal broader health issues that need to be addressed. Sheep are herd animals, and distance between an individual and the group is one of the first signs of illness: "when a sheep is sick and about to die, they know it and go apart from the rest of the animals,"[306] I was told. This was evidenced especially in sheep that attempt to isolate themselves in the stable, or dawdle behind others on the way to the pasture area, one of the first behavioral indications that something might be amiss.

While personal experience with sheep was seen as the most important factor in successfully keeping them healthy, it was also inherently subjective. A particularly messy posterior could indicate an overly liquid diet and general digestive issues, or a much more serious parasitic infection. As a result, inspecting the posteriors of each individual in the flock had to be done on a regular basis: "alright ladies, I'm in charge of inspecting your butts today!" was a common joke on the way to the stables that always managed to elicit a laugh as we walked to our morning work stations. Another practice known as "FAMACHA"[307] was useful in particular for goats and sheep, and involved inspecting and noting the color of the whites of their eyes. The more reddish tint in the whites of a sheep's eyes, the less they are being affected by anemia–the more clear or whitish they are, the greater the concentration of parasites in their body. As Alejandro called out numbers from a notepad he kept in his breast pocket, Pedro, Francisco, and I stood in the center of the stable as the ewes ambled by, scanning the numbers printed on their yellow ear tags for a match. When we found the ewes

[306] Field Notes, January 15, 2019.
[307] "FAMACHA" is an acronym derived from "FAffa MAlan CHArt," a reference to the idea's originator Dr. Faffa Malan (van Wyk and Bath 2002).

in question, we held them and called out to Alejandro to inspect their eyes and compare it with the number between 1-5 he had noted the previous week. Sheep without red in their eyes, or those that had diminished in health from the week before, he marked for further treatment or observation.

Taking care of sheep, then, is not only about knowing what each sign "stands for," but also how to interpret their gradations of meaning. Navigating the logical connections between effect and cause (e.g., a sheep is acting strange because it has anemia, which in turn is being caused by the presence of a parasite) is not always a straightforward process, involving multiple, nested decisions. Even more logical jumps are necessary to determine a proper response, in terms of both manner and magnitude. Should sheep be treated immediately, or more closely monitored? Do symptoms warrant intensive intervention (use of anti-parasite medication) or a slight change in diet? And, perhaps most importantly, does an individual sheep's illness mean that there will be bigger problems for the herd? The latter question involves a distinction between sheep bodies to understand where the issue might lie–with an individual, a bonded pair (ewe and lamb), or the entire flock. Observations of sheep (and their shit) gesture to the invisible or difficult to observe entanglements with other potentially harmful entities–including, but not limited to, intestinal parasites.

9.6 Manure Under the Microscope: Knowing through Other Species

Knowing sheep through their manure often involved collaborating with outside experts, especially in cases when illnesses became too grave or too widespread within the flock to rely simply on observation. Several weeks into my stay at Rancho Bosque, the health of several ewes and their lambs began to wane (leading, in one instance, to the deaths I reference at the beginning of this chapter). When an outside veterinarian was called in to examine the herd, the ewes were diagnosed with "anemia," a conclusion that raised more questions than answers. Anemia is a broad condition that describes the sheep's listlessness,

lack of appetite, and weakened immune systems, but its causes are related to the confluence of a variety of interrelated factors: nutrition, parasites, stress. To understand the nature and severity of parasitic infection, fecal samples were taken from sheep that appeared to be particularly ill, and brought to a veterinary laboratory several hours away by bus for further testing. The barber pole worm (*Haemonchus contortus*) was only one of several parasites that lived in the guts of sheep–including *Coccidia*, a protozoon, or *Trichostrongylus* and *Strongylus*, both kinds of nematodes.[308] The more subjective FAMACHA tests, while reliable in testing for the barber pole worm, did not indicate the presence of other possible parasites that might co-exist in varying proportions.

Manure is brought into laboratories not only as a way of knowing sheep or other livestock, but as a manner of knowing other species as well. I first entered one of these laboratories on the campus of the nearby Institute of Ecology (INECOL) at the invitation of one of the scientists there. As we entered, I noticed that the double doors were lightly misted with condensation. "Can you leave the door open, but just a crack?" the scientist asked warmly. "We like to keep the humidity pretty high in here. Keeps them happy." The shelves lining the walls of the laboratory were lined with colorful plastic buckets with handles, recalling jumbo-size ice cream containers or children's beach toys. Each bucket had been severed in half with a vertical slit, and pieced back together with masking tape. As she peeled the tape back with the edge of her fingernail, Dra. Escarabajo explained that each bucket, filled with soil and a hefty scoop of animal manure, contained a unique lifeworld of the dung beetles that her team was studying. She cracked open the halves of the buckets to reveal the interior of the beetle nest, the entry to which was barely visible from the surface. This simple method for observing dung beetle reproduction was surprisingly effective, but of course

[308] Each of these are commonly found in the intestinal tracks of many kinds of herbivores. Personal Communication, Email, "Alejandro," July 6, 2019.

didn't replicate beetle social dynamics in the fields exactly. As if to illustrate her point, she pointed to a beetle scurrying away at the presence of light. “This one is a male. In nature, he would go away from the nest immediately... in the bucket, he kind of just must stick around,” she said with a slight smile.

Dung beetles (*escarabajos estercoleros*) perform several important ecological roles for farmers, not least of which involves the re-incorporation of manure into the soil. *Dichotomius colonicus*, a dung beetle common to the pastures of the area, might reincorporate upwards of one-hundred grams of fresh manure in the process of building a nest.[309] This process not only removes manure from fields, but also contributes to soil fertility in other ways–from increasing aeration in the upper soil horizons to dispersing seeds (Ocampo-Castillo and Andresen 2018)–that manual removal of manure does not. There are many species within this classification, with each exhibiting different behaviors in relation the dung: *rodadores*, or “rollers,” *moradores*, the “dwellers” that build their nests directly in manure piles, and *cavadores*, the “digging type.”

This ongoing research on dung beetle behavior is framed by an understanding that beetle reproduction and species diversity is deeply connected to the activities of local agriculturalists in the fields. Part of Dra. Escarabajo's research involved consulted directly with local farmers about their practices of livestock management, in order to better understand how these practices influenced beetle ecology. While many farmers rely on the ecological services provided by dung beetles in removing manure from fields, a myopic focus on sheep health could unwittingly produce results that worked against farmers' best interests. “Specifically, when administering ivermectin [an anti-parasite medication] to livestock, it affects beetle larvae, and the larvae doesn't develop. But the adults, when they consume the manure or use it to make their nests... it affects their muscular development. If

[309] See also Huerta Crespo and Cruz Rosales (2016).

they're *cavadores* (digging types), they don't have the energy to leave their nests."[310] Recommendations her team developed for local ranchers placed an emphasis on education and discussion with local ranchers, working to develop an awareness of the ecological services that dung beetles provide.[311]

The practicalities of working in the field and the habits of sheep made certain pieces of this expert advice easier to follow than others. Some of the recommendations that Dra. Escarabajo's team had recommended for included the very strategies that Rancho Bosque practiced–including rotating livestock through pastures regularly, and relying on laboratory tests of fecal samples from livestock in order to determine the exact composition of parasites (and therefore, the best course of treatment). Other recommendations, such as using "green barriers" (mature trees and shrubs) to separate pasture spaces, were not seen as necessarily commensurate with Rancho Bosque's existing strategy. "After all, an animal with sufficient food, water, and shade in the parcel will not seek to leave it" regardless of barriers, Alejandro explained, "that's why we focus on making sure the good grasses they like to eat are growing, that the *potreros* are well-maintained." Until then, he reasoned, they could always rely on the electrified fencing that ran between parcels and the forest edge–just in case the animals decided to stray.[312]

9.7 Composting Diverse Ways of Knowing: Alejandro's Experiment

When he first arrived at Rancho Bosque, Alejandro hadn't intended to become one of the key caretakers of the community's livestock. Instead, his main goal had been to carry out an experiment that involved a unique object of study: cow manure pats. With Jens as an informal mentor, and the supervision of entomologists and agronomists from his home

[310] Interview, April 27, 2019.
[311] See Huerta Crespo and Cruz Rosales (2016).
[312] Field Notes, May 24, 2019. Personal Communication [e-mail], July 6, 2019.

university, Alejandro's plan had been to measure the circumference of the uneaten grass around cow pats to calculate the loss of land productivity due to "improper waste management."[313]

But in setting up his experiment–marking wooden stakes with numbers and placing them into his "control" pats–Alejandro became interested in the insects he encountered in the field. Specifically, he noticed a particular species of dung beetle ("the digger type") and their distinctive piles, refuse from the beetles' burrowing in fresh dung, when he went to make his measurements. Upon observation, a new question had occurred to Alejandro–would the *cavadores*, dung beetles that depended on piles in which to dig, be affected by the practice of spreading manure? Would the population increase or decrease by spreading around its 'raw material'?[314] Both his university classes and studying Rancho Bosque's resources on biodynamic agriculture had plenty to say about sheep and manure–but little on the effects of these practices on the dung beetle populations on which they relied for ecological services.

Alejandro's experiment with dung beetles and cow manure revealed a process of knowledge construction that was as much about reconciliation as it was revelation. He explained that his initial aim was to defend the practice of manure spreading, a practice that he had heard in his university classes could be harmful–after all, "off gassing" from manure spread on fields was precisely the kind of thing that contributed to climate change. But later, he realized, leaving the manure piles in place seemed to be worse of a strategy, especially for small farmers. His own observations of sheep in the pastures had revealed that animals indeed avoided eating the grass in the areas around where they had previously defecated. Productivity, Alejandro and the other residents that worked with livestock told me, was not just about "making more money" or "having more meat"; it was also about preventing the

[313]Personal Communication, e-mail, July 6, 2019; Field Notes January 15, 2019
[314] Personal Communication, July 6, 2019

loss of remaining cloud forest that encircled their community by using the space available to them in more effective ways.

At the same time, maintaining these established “best practices” were not always feasible, even by farmers who considered the achievement of sustainable, biodiverse agroecosystems to be a primary goal. For example, testing the fecal matter of individual animals is not only an expensive process, but involves time that farmers cannot afford to spend away from their fields. On the days that Alejandro traveled to the nearest laboratory for an analysis of the precise kinds of parasites present in the herd's population, he left shortly after waking, and returned only as dishes were being washed from the communal dinner. In his absence, other residents of the community had to be apprised of the tasks needed for the day–which areas of the pastures needed to be observed, which kinds of grass needed to be cut back, and which lambs needed extra attention.

For Alejandro, this information was almost second nature–individuals were identified by their coloring or features, personalities, or how they approached him when he opened the stable doors in the morning, rather than the numbers on their ear tags. Translating these more personal and affective ways of knowing the sheep in his herd into ways that could be understood by others in the community–even those skilled in the care of the community's other livestock–took time that he simply didn't have in the course of a normal workday. As a result, Alejandro and others who cared for livestock developed a pragmatic approach to livestock care, appropriating bits of knowledge from different sources as they became necessary. In lieu of regular laboratory tests, Alejandro relied on the knowledge of local residents who lived adjacent to the community and were sometimes hired as wage laborers.

The questions that arose in the process of his work hinted at gaps in the explanatory power of specific approaches to agriculture, and reified in Alejandro's mind the importance of personal experience and observation in becoming a skilled agriculturalist. Walking back

from one of these trips to observe new beetle activity in manure piles, I asked whether his curiosity about dung beetles and their relationships with sheep was influenced by the community's practices of biodynamic agriculture. Alejandro thought for a moment, and then demurred: “I mean... I definitely think there is some value in [biodynamics]. For example, what Fredi was doing to the macadamia trees,” referring to another resident's work the previous day, making a balm from natural resins to fill in gaps in the bark of the trees and prevent pests. “But there are other things that make me a little bit uncomfortable, like… *yeah, OK*,” he said sarcastically. “Things like ‘the moon is in Virgo, therefore we need to do this and that.’ I mean, I understand why they say it, but…” He concluded with a shrug, telling me he knew what he knew about sheep from working with them directly, and there wasn't much more he could say than that.

Weeks after I left Rancho Bosque for the last time, Alejandro emailed me a folder of photos he had taken of the control pats he had marked for later observation, left in the field rather than spread, buried, or added to the compost pile. The close-up images of the manure piles showed unmistakable signs of life: the entrances of small tunnels burrowed into the piles, round balls of construction waste piled neatly outside, and in some cases, the dung beetles themselves. Alejandro wrote to me that his growing responsibilities at Rancho Bosque had taken him away from his experiment temporarily. He had lost track of some manure piles in the tall grasses that sprung up after the rains, and would have to wait until the seasons changed and larvae hatched to make any conclusions. But he also pointed out another detail in the photographs: the grass was taller in small patches, tracing the circumference of the manure pile. “So you see, the cows don’t actually eat near [the manure], so if you see it like that–well, it’s wasted land.” If cows weren’t able (or willing) to graze in particular areas, he reasoned, the farmers would need more space to make a living, maybe cut down more trees. What was more environmentally friendly, then: to leave the pats intact for the beetles,

or disperse them for the forest?

9.8 Conclusion

In this chapter, I argue that both the material and metaphorical dimensions of manure work to produce the "shitscape" of Rancho Bosque. Tracing the paths of manure through the landscape of Rancho Bosque reveals the ways that waste and its repurposing is implicated in the creation of regenerative agroecosystems. As a material, manure is moved, processed, transformed, and used in the production of cultivating crops, which in turn support the lives of the other human (and more-than-human) residents of Rancho Bosque. The very presence of manure signals the reconfiguration of (agro)ecosystems put into motion by the historical introduction of livestock. In this sense, manure is not only generative in the sense that it supports the production of new life, but also the reconfiguration of how more-than-human lives are brought together in cycles of life and death, decomposition, and regeneration. Manure is not only operationalized as a material, but as a metaphor for thinking through and legitimating agricultural practice. As discussed above, manure constitutes not only a key substance in biodynamic agriculture, but also a conceptual object for explaining the principles of energetic exchange and transformation that underpin biodynamics.

Understanding manure on both a metaphorical and material register provides a way to see how agricultural knowledge is stitched together with place. I discuss how shepherds and other caregivers understand animal health and wellbeing through manure, and how these interpretations produce material outcomes for the entire agroecosystem of the ecovillage. In particular, I call attention to the various ways that manure is "read," and how residents seek to understand the animals they care for through the traces they leave behind. These "ways of knowing" implicate different forms of knowledge, gathered from both anecdotal experience as well as outside experts like lab scientists, veterinarians, and other farmers and ranchers. Manure is a vital material for bringing together and making sense of different ways of

knowing about sheep.

Alejandro's experiment ended with few easy conclusions, and perhaps raised more questions than answers. But it also revealed the fraught process of balancing multiple priorities in constructing and maintaining "self-sustaining" systems. As a vector of both disease as well as a tool for regeneration, the management of manure speaks to the practical difficulties of managing the complicated entanglements of the lives and deaths of more-than-human others. Further, how ecovillagers understand and make choices about what to do with manure underscores the subjective nature of knowledge creation, depending largely on the context in which materials are encountered as well as existing frameworks for making sense of new information.

Conclusion

The world was, quite frankly, a different place when I began the research and early drafts of this dissertation. The events of the past years–including the outbreak of a global pandemic, intensification of extreme weather events, and growing social and political unrest worldwide–make it clear that drastic changes in human societies will be necessary to confront these challenges as well as others that will emerge in the future. The call to craft sustainable futures invoked at the start of this work is now more important and urgent than ever. It is also becoming increasingly clear that these designs for sustainable futures must consider more-than-human interests just as well as human ones.

Ecovillage imaginaries present an optimistic rejoinder to the catastrophic narrative of impending social and environmental collapse, offering a hopeful image of "small groups of people the world over…coming together to create modes of living in harmony with each other, with other living beings, and with the earth" (Litfin 2012, 125; see also Trainer 1998). Formulated as an adaptable model that can be adjusted to diverse social and environmental contexts, the ecovillage concept rests on a particular notion of human control in response to precarity: hard-to-tackle problems like climate change or global biodiversity loss are rendered actionable at the level of community or individual through changes in livelihood, consumption patterns, and ways of relating with both human and more-than-human others. Growing scholarly attention to the emergence of such communities has tended to echo this optimism, with scholars asking how lessons from ecovillage case-studies might be scaled up to other contexts (Daly 2017, Litfin 2012, *Ibid.* 2016). These inquiries are rooted in an understanding of ecovillage as both a localized phenomenon and replicable model: a unique expression of community life from which lessons, best practices or generalizable principles can be gleaned, refined, and applied elsewhere.

This dissertation unpacks the idea of ecovillage-as-model by calling attention to the different ways that sustainability is constructed, imagined, and practiced by distinct communities throughout Mexico. These differences correspond, in part, to how ecovillage residents understand their ability to control and manage nonhuman nature. The distinctions between these understandings of sustainability become evident through more-than-human others. While Tierra Madre residents sought to design a closed loop system in such a way that would remove the burden of involvement or labor for human residents, Residents of Rancho Bosque held the opposite understanding of humans as obligate "guides" for the livestock and plants they cultivated, necessitating attentiveness through hard work. These differences are even more significant considering that ecovillages share similar reference points (e.g., other well-known ecovillages or influential figures) and fields of practice (e.g., regenerative agriculture or permaculture design). Rather than iterations of a central model for sustainable community, ecovillage residents instead develop understandings of what it means to be sustainable that are specific to the multispecies relational contexts of their individual communities, understandings which are formed and refined in relation to daily more-than-human encounters in stables, pastures, gardens, and greenhouses.

Distinct imaginaries of sustainability (Murphy and McDonagh 2016) emerge through localized and context-specific practices of care, which in turn iteratively shape ecovillage landscapes over time. These practices of care are partial and situated (Haraway 1988) in the sense that they are embedded in and contingent on individual experiences in place and modes of understanding more-than-human others. Tracing the ecological entanglements and the environmental histories of ecovillage communities reveals a succession of human master plans, design decisions, and fields of practice that have shifted along with prevailing cultural understandings of how to manage and live within the environment. Considering the significant ways that currents of globalization have been transposed onto Mexican

landscapes–the specific ecologies brought about through colonialism, the Green Revolution, and neoliberal capitalism–to which "nature" do ecovillage residents aspire to "harmonize" with? Both the grassy pastures of Veracruz and the scrubland forests of central Yucatán reflect long histories of landscape use and change for as long as there have been human inhabitants; where, then, might we locate a distinction between "nature" and "culture"? Where does one intervention end, and another begin? And how do embodied experiences in a particular environment shape the way communities (learn to) live within it?

Ecovillage communities in Mexico are deliberately designed as sites of both human and more-than-human collaboration, and following how this broader goal is transposed on landscapes reveals differences in what communities prioritize, care about, and neglect or reject. In tracing how species are mobilized for and involved in the production of sustainable livelihoods, I developed an understanding of each community as more than the product of the visions, knowledge, and experiences of the human residents of each site, but as assemblages equally shaped by the more-than-human others they involve. Through discussing plants, animals, and others that compose ecovillage spaces, I also drew attention to the ways that more-than-human others are engaged in their own practices of placemaking, and at times counteract or contest human plans for them. These expressions and concrete acts of more-than-human agency influenced the outcomes of community designs, and as such had a significant role in the longevity and resilience of each community in responding to different challenges that arose over time. In discussing the key findings of each chapter below, I show versions of sustainability are produced in place, imagined across scales, and enacted through more-than-human assemblages.

Towards Multispecies Sustainabilit(ies)

This research makes separate contributions to two related discourses–the anthropology of sustainability and multispecies studies– and suggests further room for engagement between these perspectives.

First, I argue that an anthropology of sustainability narratives and their circulations must critically engage with the materialities and embodied consequences of those narratives. Sustainability has long been a fraught term–one that is loaded with cultural (and increasingly political) capital, but which may or may not indicate an underlying transformation of the "business as usual" approach (Phillis and Andriantiatsaholiniaina 2001, Johnston et al. 2007, Jabareen 2008). The net effect is a disambiguation of sustainability in broader societal and policy contexts, where "what is sustainable" is equally determined by what is socially amenable or politically convenient. Without material terms–or more-than-human bodies–to root understandings of sustainable livelihoods in place–these sustainability debates remain conceptual and disembodied from the practices of cultivation and conviviality where they take on meaning.

Despite growing scholarly interest in nonhuman animals, insects, plants, and others as social subjects in their own right, dominant sustainability narratives continue to be framed largely in human terms and human needs (Rupprecht et al. 2020). Ecovillage communities are dependent on more-than-human others for more-than-material reasons; in addition to providing fuel, food, or income, more-than-human others (and even further, the ways they are cared for) become central figures and components of the underlying conceptual bedrock of communities. With the understanding that the relative "success" of the ecovillage as a model is dependent on multispecies collaborations, (rather than solely on, say, the ingenuity or disposition of community members, or the resources they have access to), it follows that the *quality* of these relationships matter. By bringing attention to the active role that more-than-

human others play in shaping sustainability projects like ecovillage communities, this dissertation demonstrates the need to not only account for more-than-human others as abstract stakeholders, but also as central figures that determine the outcomes of sustainable world-building projects (Tsing et al. 2017, Malone et al. 2017, Houston et al. 2018).

The ways that more-than-human others are involved in and contribute to sustainability projects depend on the place-based contexts in which they are encountered. An illustrative example of this was the use of non-native grass across communities. The *Mombasa* grass of Aldea Ceiba, both introduced and uncultivated, became a local and renewable solution to emergent issues– thatching for roofs, or green manure for new garden beds. In Rancho Bosque, on the other hand, *pasto estrella* joined two interrelated projects on which the community premised their goals and practices–soil care and livestock care–and thus became a central feature of daily work at Rancho Bosque to the extent that some shepherds described their work as caring for pastures (*pradicultores*), rather than sheep.[315] In both communities, the ways grass is understood and managed–as resource, weed, or somewhere in between–vitally depends on the environmental, historical, and social contexts of the ecovillage as a place. These contextual differences produce different practices of care and ways of knowing that influence how certain beings are put to work in sustaining other beings, which in turn becomes imprinted on landscapes (which in turn, becomes context for new sustainability understandings).

Additionally, this research suggests the generative possibilities of a renewed attention to the boundaries of place within multispecies studies. Understanding sustainability as place-based concept might suggest that sustainability is a subjective construct, dependent on the specific relationships between different beings in a particular place and time (and thus, perhaps irreproducible in other contexts). It might follow, then, that there is as much variation

[315] See Morris (2022) for further discussion.

and range of sustainability narratives as there are human cultures (and possibly, nonhuman cultures as well). Greater attention to the changeable roles of more-than-human others as we enlist them in projects of ecological repair and regeneration would be useful for the refining strategies of implementing sustainability projects.

The Life and Death of Ecovillages

This analysis was shaped by organizing findings around three thematic pillars borrowed from assemblage theory (DeLanda 2006; Anderson and McFarlane 2011)– gathering, coherence, and dispersion–in order to highlight different patterns of relationships at each stage in the ecovillage "life cycle." Developing an understanding of how ecovillages are shaped by biotic trajectories–coming into being, becoming coherent systems, and dissolving and re-becoming something new–establishes a framework for determining how more-than-human others are implicated at each step of the way. Each of these sub-themes were addressed through pairs of chapters, which alternated between the general (i.e., insights from across research sites) and the specific (i.e., insights from selected ecovillages, highlighting particular multispecies relationships). Below, I summarize the key findings of each chapter, drawing comparisons between each pair.

Challenges of Gathering in Place

This research demonstrates importance of place in shifting practices of sustainability, and hence the way sustainability is narrated, understood, and pursued by different communities. As I discuss in chapters 4 and 5, gathering–as a process of drawing together materials, knowledges, and other beings in the production of new social imaginaries–is not only shaped by acts of conscious selection and design, but also determined by the historical, cultural, and political contexts that permit or preclude certain ways of relating and being.

The challenges of "gathering in place" are the product of more-than-human agencies as they interact with (and potentially challenge or revise) human sustainability plans. Ecovillages constellate around particular actors, practices, and ultimately, collective narratives of sustainability. These groupings are by no means exhaustive, nor are they mutually exclusive; paradoxically, the act of naming categories revealed how one "gathering" flow is intertwined with the other. Chapter 4 demonstrated the difficulty of compartmentalizing and defining different elements within the ecovillage assemblage: pulling on any of these strands in the larger "web" activates lines of connections to other actors, revealing their intersections and overlaps.

Furthermore, more-than-human agencies can complicate human plans, redirecting energy, effort, and patterns of care. In chapter 5, I used examples from Tierra Madre to talk through how different elements and beings converge in ecovillage landscapes, playing with the concept of gathering not only as a state of co-presence with others but as an active state of selection and curation from a field of possible actors, materials, and elements. Following from this understanding of gathering as a practice of priority-making–of choosing to care for and live with certain beings as opposed to others–I applied this analytical lens to the community of Tierra Madre, with the aim of understanding what kinds of guiding principles organized this selection-making process. Through engagement with the format established in the preceding chapter, I discuss how Tierra Madre's community goals (to create a particular kind of space for particular women) influenced such aspects as what kinds of plants were cultivated in the garden to how they received and allocated funds. I also discuss how human plans for the design and function of Tierra Madre were complicated by the more-than-human others that residents sought to enlist in their place-making work. In failing to thrive as expected, the animals, insects, and plants of Tierra Madre revealed the complications of

designing with more-than-human others, particularly by thriving or perishing or perishing in unanticipated ways (a theme to which I return in chapter 8).

Place matters in the outcomes of sustainability projects–not only how sustainable imaginaries might be translated onto landscapes, but also Cultural, economic, and political factors produce the conditions by which ecovillage residents can form and maintain communities, revealing how access to financial resources or social connections become entangled in the production of ecovillages as spaces. Some of these factors are co-determinative: that is to say, the kinds of people that gather in a particular community depend in part on the community's alignment with certain principles, beliefs, or sets of practices; these in turn depend on/enable participation in certain income-generating activities, which in turn rely on the enrolment and participation of certain species, and so forth. The development of the idea of "gathering through exclusion" in chapter 5 showed how ecovillage assemblages are not only created additively (i.e., by bringing together different elements or beings), but also through practices of exclusion–of drawing and maintaining boundaries. Perhaps more significantly, discussion in chapter 5 also revealed how these choices are not navigated by human residents alone, but also by more-than-human inhabitants. These themes of more-than-human resistance and responsibility in creating (or unmaking) broader community systems were continued and explored in greater detail in the chapters that follow.

Interdependent Coherence

Narratives of sustainability and practice inform one another, and depend on relations of care with more-than human others. Chapter 6 explored the idea of "coherence," understood as the processes by which ecovillage residents both make and make sense of their communities as places. Here, I examined how different ecovillage residents evaluate and engage with different ways of knowing about the landscapes they inhabit and the more-than-

human others they work with. Drawing on the results of multispecies map-making workshops in both Rancho Bosque and Aldea Ceiba, this chapter showed how residents' understandings of their community's space were shaped by underlying conceptual models of more-than-human nature and what the role of humans should be in relation to it. At Rancho Bosque, for instance, the highly segmented spaces and focus on livestock (and their manure) as key subjects corresponded with residents' understandings of their role as organizers and mediators of different "parts" of a broader farm system. This chapter also discussed how the partial perspectives of individual residents (evidenced by individual maps) become part of collective understandings over time, through repetition of sustainability narratives in shared settings such as guided tours, community meetings, and classes or workshops. This interplay between the conceptual and the material–the way practice informs ecological knowledge, which in turn informed practice–becomes imprinted on ecovillage landscapes over time.

Practices of care are central to coherence-making processes. Chapter 7 focused on Aldea Ceiba and their practices of caring for different bee species, this chapter developed an understanding of "caring in order to care" to explain how residents' engagements with more-than-human others became broader and more complex over time. Discussions in this chapter revealed how the ecological and social entanglements of the native bee species that Aldea Ceiba sought to cultivate implicated the care of other kinds of species, even including "competitor" species such as *Apis mellifera*. A key takeaway from this chapter is that coherence-making is not only an iterative process, but a localized one, relative to social and environmental contexts. In the case of Aldea Ceiba, for example, *Apis mellifera* was a species that was treated warily (as a non-native competitor to threatened *Melipona* species), but which was ultimately was seen as necessary for other ends (as generalist pollinators in the "blasted landscapes" of Yucatán, *Apis* bees could be recast as a defender of the *Melipona*.

Ecovillage landscapes physically reflect the underlying sustainability narratives of its residents, and these sustainability narratives are made coherent through the lives of more-than-human others. In other words, what is "sustainable" is a subjective designation, depending largely on the participation of more-than-human others in particular ways. It follows, then, that sustainability narratives can be shaped in unpredictable ways, as plans and designs are put into practice, and other cared-for beings may or may not thrive according to plan. To this end, the idea of "caring in order to care" speaks to the limits of multispecies design for sustainability, and further develops an understanding of more-than-human care as a rabbit's den of overlapping and contradictory approaches which must be navigated by being traveled. In this sense, these two chapters work towards the argument that a sustainable community cannot be "implemented" so much as "arrived at."

Dispersion of Networked Relationalities

Finally, the networked relationalities that compose these communities might, and often do, come undone. Chapter 8 focused broadly on the theme of death across each community, and teased out the qualitative differences in the ways that death (whether "good," "unexpected"/something to be managed, or "bad") informed and changed the sustainability narratives at play in community practices. Drawing on the results of ethnographic fieldwork in each community, I argued that the ways that the unanticipated deaths of plants, animals, and insects often signaled gaps between the expectations and sustainability narratives of ecovillage residents and the lived social realities of the more-than-human others that they sought to care for. I linked the breakdown of ecovillage communities (interpersonal conflicts, departures, and community dissolutions) to more-than-human deaths, showing how the same misunderstandings or miscalculations that are involved in more-than-human care can impact the fate of the whole community.

Nevertheless, death, illness, and "dispersal" generate new kinds of sustainability narratives. In chapter 9, I took up manure (in particular, sheep's manure) as an object lesson for understanding how ecological knowledge is challenged and ultimately transformed through practice. Drawing on the ecological history of manure in the Veracruz landscape and its various uses and significations within agricultural landscapes, this chapter discussed how manure was used as material (in both a physical and conceptual sense) by ecovillage residents for generating new understandings about the animals they cared for and the practices they used to accomplish this. Ultimately, this chapter argues that there is no one way to strike an optimal balance between more-than-human relationships in a way that is "sustainable," and the sustainability narrative (and hence, how best to act/intervene/manage more-than-human others) changes depending on the more-than-human lives that it privileges.

Thus, sustainability imaginaries depend on the more-than-human others that ecovillage residents enlist in the project of community-building. Taken together, insights from each of these three sections–gathering, coherence, and dispersion–reveal important ways that the sociocultural and ecological particularities of specific places impact how sustainability is practiced in each community. At surface level, this finding seems unsurprising: the environment of Veracruz is more amenable to raising pastured livestock or cultivating organic coffee than Yucatán, for instance, and thus it makes sense that ecovillage residents might adopt these practices as key elements of a self-sustaining system. But more importantly, this research also shows how superficial differences between communities are also underpinned by place-specific politics of knowledge construction: localized processes unique to each community by which certain practices or explanatory mechanisms are tested, legitimated, and reproduced (or alternatively, discarded). In this sense, sustainability might also be understood as place-based because it only becomes a meaningful organizing concept

in the *embodied contexts* of ecovillage landscapes, indelibly shaped by the motivations and priorities specific to each community.

More-Than-Human Sustainability Narratives

Ecovillage engagement with more-than-human others through distinct patterns of care reflects underlying epistemologies of socioecological connectedness. While the small number of research sites explored here makes it difficult to generalize these results or identify a "typology" of sustainability narratives, this research points to a few ways that differences between communities might be understood. One of these distinguishing factors was how the role of humans was conceptualized in relation to the more-than-human residents of their community. At Rancho Bosque, for example, ecovillage residents often referred to themselves to be "mediators" tasked with controlling the balance of more-than-human lives and deaths. In contrast, Aldea Ceiba residents placed a greater focus on fostering interspecies relationships not through top-down control, but as an ongoing process of collaboration with other species (both cultivated and not). On the other end of the spectrum, residents of Tierra Madre expressed their positionality more as the "beneficiaries" of their agricultural systems, and often sought ways to automate caregiving tasks or generally reduce the extent of human involvement. While none of these approaches were more or less "correct" than any other, they reflected linkages to particular ways of knowing: Rancho Bosque connected this emphasis on the necessity of human "mediators" to be rooted in their practice of biodynamic agriculture, for example. Each of these narratives reflect different kinds of assumptions about the role of humans in relation to (or as part of) the wider natural world, and reflect a spectrum of ideas about ecological relationality, and more broadly, the possibilities of multispecies design.

Each ecovillage sustainability narrative also reflects a different role relative to a broader public. The effects of these external connections were touched on in the Introduction, particularly in discussing how ecovillage communities emerge in relation to emergent social and environmental problems, and in the discussion of Tierra Madre and the concept of "gathering through exclusion." But even more, different communities differed regarding who their projects were imagined for. Aldea Ceiba's engagement with native insect and flora species, for instance, hewed closely to their commitment of solidarity and support for the local indigenous community. Through their work hosting educational experiences and workshops for community youth, Aldea Ceiba residents signaled their presumed role as allies in the task of conserving traditional knowledge. This might be contrasted with communities like Tierra Madre, which understood their role as serving a broader, imagined community of like-minded women rather than the communities neighboring theirs. These instances speak to the expectations that ecovillage residents have for their community projects to effect social and environmental change–more precisely, they locate *for whom* sustainable imaginaries are being designed, and who they are intended to serve. Many of the reasons that ecovillage residents identify for joining or founding ecovillage communities in Mexico is in response to localized and culturally embodied experiences of precarity.

These findings also complicate the understanding of sustainability as a scalable or implementable project, as it has so often been framed. If the outcomes of sustainability projects hinge on context, place, and embodied relationships, whereas scalability is rooted in the "indeterminacy of the encounter" (Tsing 2012), this also necessitates a reconsideration of how sustainability might be operationalized or achieved. In the final section, I indicate a few future directions for further research.

Future Directions

While this study was situated in Mexico, there are several ways that the geographic boundaries of the research could be expanded. Until relatively recently, much of the research on ecovillage communities has centralized examples from Europe, Australia, and North America. Many elements of the social, historical, and environmental histories of Mexico in which emerging ecovillages are embedded are shared with other countries in Latin America, and in so-called Global South countries more broadly. Indigenous struggles for sovereignty, erosion of biocultural resources, gender-based violence, and a pattern of land grabbing in rural, low-income regions are pervasive issues (among others) that are symptomatic of broader entanglements in global capitalism. As more and more individual projects are founded and national networks of ecovillages in Latin America grow,[316] future research could adopt a comparative framework for understanding how different communities respond to these challenges.

Similarly, further work could be done to explore how ecovillage communities and other grassroots, place-based community projects are produced by broader networks of transnational relationships. An initial aim of this research was to examine the ways that ecological knowledge and practice traveled through these networks, eventually winding up in particular ecovillage communities–perhaps through affiliations to broader social movements or organizations, or brought by volunteers or other visitors who had traveled to other communities. As a result, interviews with volunteers, visitors, and workshop leaders in each of the communities included questions on participants' prior experiences with relevant domains of ecovillage knowledge, as well as time spent living and working in other communities (both in Mexico and beyond). Field notes were also recorded, where relevant,

[316] The Council of Sustainable Settlements of Latin America held its first meeting in 2012, and has rapidly grown to comprise four regional nodes (with a fifth emerging in Peru), as well as a network for youth and for nomadic caravans. ("CASA por Regiones" CASA Latina, Global Ecovillage Network Latin America. https://ecovillage.org/region/casa/regiones/. Accessed April 2021.)

that noted community residents' ties to other ecovillage communities, particular schools or demonstration centers, and linkages to social or environmental justice movements or organizations in their home cities/countries. While some of these findings have informed the background and analytical chapters of this dissertation, more analysis could be directed towards these interactions, and could be fruitful for understanding how alternative practices and "ecovillage knowledge" travels between and among different communities from different locales.

Finally, further research on the consequences of competing sustainability projects would carry the aims of this project forward. How to contend with an emergent plurality of sustainable alternatives is an important question–if sustainability is inherently relative and context-dependent, what hope might there be to cultivate, on any meaningful scale, the kinds of urgent societal transformations increasingly seen as necessary to survive on a changing planet? How might lessons learned in the "laboratories of sustainability" ever be useful if they don't have legs beyond the labs?

By tracing sustainability narratives through the more-than-human assemblages of ecovillage communities, this dissertation offers a different way to think about the instructive potential of ecovillage projects. Understanding how sustainability projects are shaped through more-than-human others helps to "extend the conceptual terrain within which the Anthropocene scholarship currently operates" (Lövbrand et al. 2015, 212); namely, a natural scientific narrative that frames nature as "an object external to society with 'natural' limits and tipping points that can be discerned, quantified, and managed" (Lövbrand et al. 2015, 213). Instead of understanding the challenges to ecovillages and their longevity as symptomatic of a failure manage, these reflections speak to a different kind of challenge for the future–to learn to lay down the designers' tools, and to give over part of our sustainable imaginaries to the more-than-human beings that occupy and create these futures with us.

Appendices

Appendix A. Informed Consent Documents [in Spanish and English]

Información por Participantes del Proyecto

Descripción de la investigación: Este proyecto es una parte de mi tesis doctoral, que trata principalmente sobre "*ecoaldeas*" en México, y cómo esas formas de comunidades intencionales se involucran en la producción y divulgación de distintas formas de conocimiento ecológico, a través de redes sociales tanto en México como en el extranjero. En concreto, utilizo el concepto de etnografía multiespecies, para entender cómo las llamadas comunidades ecológicas, entienden y trabajan con sus entornos ecológicos. Los habitantes de las ecoaldeas proceden a menudo de diversas partes del mundo, y como resultado, sus impresiones sobre las condiciones del medio ambiente local están condicionadas por sus experiencias en otros lugares. Para poder desarrollar un entendimiento más amplio de asuntos específicos en el que las ecoaldeas se basan, intentaré recopilar experiencias de personas con conocimientos en estos asuntos (por ejemplo, investigadores académicos, activistas de la comunidad, etc.)

Descripción de Participación: la participación en este proyecto tomará la forma de una entrevista semiestructurada, con una duración aproximada de 40-60 minutos. Los asuntos tratados tendrán relación con el ámbito de estudio del entrevistado y relaciona el impacto del desarrollo comunitario con los sistemas ecológicos locales.

Riesgos y Beneficios de Participación: Existe la posibilidad de que la información recopilada durante las entrevistas sea utilizada en la elaboración de mi tesis doctoral, de forma que centraré mis esfuerzos en que los comentarios del entrevistado se plasman de una manera justa, sin embargo, es posible que haya lugar a malentendidos. Para evitar dichos malentendidos, estaré dispuesta a compartir las partes relevantes de mi tesis con el entrevistado para asegurar una información completamente transparente y fidedigna. Desafortunadamente, no puedo ofrecer remuneración económica por su participación en este proyecto de investigación.

Declaración de confidencialidad: las entrevistas serán grabadas a través de una grabadora de voz, para posteriormente ser traspasadas a una cuenta de almacenamiento en la nube debidamente protegida mediante contraseña. Aparte de las citas usadas en la publicación de la tesis, dichos archivos no serán compartidos con personal externo. El entrevistado puede suspender su participación en el proyecto en cualquier momento (durante o después de la entrevista), o efectuar cambios en los comentarios proporcionados. Por favor, utilice la información de contacto proporcionada a continuación.

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Information for Research Participants

Research Description: This project is part of my doctoral dissertation, which focuses on ecovillages ("ecoaldeas") throughout Mexico, and how these kinds of intentional communities are involved in the production and dissemination of ecological knowledge through forms of social networks, both within Mexico and beyond. Particularly, I am using a "multispecies ethnographic" approach, to understand how so-called "ecological communities" understand and work with their ecological surroundings. Ecovillage residents often come from, or are trained, in diverse parts of the world; as a result, reflections on local environmental conditions are often filtered through their experiences in other places. In order to develop a broader understanding of issues specific to the areas in which ecovillages are founded, I am seeking out the expertise from other people knowledgeable about these topics (for example, academic researchers, community activists, etc.)

Description of Participation: Participation in this project will take the form of a semi-structured interview, which will last approximately 40-60 minutes. Topics discussed will be related to the interviewee's field of study and recent research, and generally relate to the impacts of community development on local ecological systems.

Risks and Benefits of Participation: The information gathered from interviews may be used in the publication of my doctoral dissertation. While every possible effort will be taken to make sure that your comments are represented in a fair and relevant manner, misunderstandings can always arise. I am more than happy to share the relevant portions of my dissertation with you in order to ensure accuracy and transparency. Unfortunately, I cannot offer any financial compensation for your participation in this research project.

Statement on Confidentiality: Interviews will be captured on an Olympus voice recorder, which will then be transferred to a password-protected cloud storage account. Apart from quotes or statements used in the publication of the dissertation, these files will not be shared with anyone. You are completely free to withdraw your participation at any time (including during or after the interview), or to make changes to any comments that you make. Please contact me using the information below.

How to Contact Me:
Questions or comments about this research project can be directed to either me or my supervisor, Dr. Guntra Aistara. Our contact information is listed below.

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Appendix B. List of Key Participant Observation Events

	Type of Recording	Site	Description
10/14/2014	Interview	Eco-Community, Jalisco	Interview with Founders
6/6/2018	Interview	Aldea Ceiba	Interview, Volunteer
6/10/2018	Interview	Aldea Ceiba	Interview, Visitor
6/10/2018	Workshop	Aldea Ceiba	Community Evening Workshop
6/15/2018	Interview	Aldea Ceiba	Interview - Ecovillage Resident
6/15/2018	Interview	Aldea Ceiba	Interview - Ecovillage Founder
6/18/2018	Interview	Aldea Ceiba	Interview - Ecovillage Founder
6/18/2018	Workshop	Aldea Ceiba	Workshop - Forge & Metalworking
6/19/2018	Interview	Aldea Ceiba	Interview with Resident
6/20/2018	Interview	Aldea Ceiba	Interview with Volunteer
6/23/2018	Interview	Aldea Ceiba	Interview with Volunteer
6/25/2018	Interview	Aldea Ceiba	Interview with Volunteer
6/25/2018	Workshop	Aldea Ceiba	Metalworking Workshop
6/25/2018	Class	Aldea Ceiba	Workshop
6/27/2018	Interview	Aldea Ceiba	Interview with Founder
6/28/2018	Interview	Aldea Ceiba	Interview with Resident
6/29/2018	Interview	Aldea Ceiba	Interview with Resident
6/29/2018	Interview	Aldea Ceiba	Interview with Visitor
6/29/2018	Interview	Aldea Ceiba	Interview with Resident
7/1/2018	Walkthrough	Rancho Bosque	Walkthrough of Rancho Bosque
12/21/2018	Class	Rancho Bosque	Class with Resident
1/16/2019	Class	Rancho Bosque	Class with Founder
1/19/2019	Interview	Rancho Bosque	Interview with Resident (Management)
1/28/2019	Class	Rancho Bosque	Class with Founders
1/30/2019	Class	Rancho Bosque	Community Meeting
2/2/2019	Workshop	Rancho Bosque	Mapping Workshop
2/6/2019	Class	Rancho Bosque	Class (Coffee)
2/7/2019	Interview	Rancho Bosque	Interview with Volunteer
2/11/2019	Class	Rancho Bosque	Class with Founder (Soil)

2/11/2019	Interview	Rancho Bosque	Interview with Founder
2/11/2019	Meeting	Rancho Bosque	Community-Wide Meeting
2/12/2019	Walkthrough	Rancho Bosque	Walkthrough, Visitor Group
2/17/2019	Meeting	Rancho Bosque	Meeting with Founder
2/18/2019	Class	Rancho Bosque	Class with Resident
2/18/2019	Interview	Rancho Bosque	Interview with Apprentice (Beekeeping)
2/19/2019	Class	Rancho Bosque	Class on Beekeeping - Rancho Bosque Visitor
2/20/2019	Class	Rancho Bosque	Class with Resident
2/20/2019	Interview	Rancho Bosque	Interview with Resident
2/20/2019	Walkthrough	Rancho Bosque	Walkthrough with Visitor Group
2/22/2019	Interview	Rancho Bosque	Interview with Resident (Sheep)
2/22/2019	Interview	Rancho Bosque	Interview with Apprentice (Dairy)
2/24/2019	Interview	Rancho Bosque	Interview with Resident (Management)
2/24/2019	Interview	Rancho Bosque	Interview with Local Expert (Garden)
2/27/2019	Interview	Rancho Bosque	Interview with Resident (Garden)
2/27/2019	Walkthrough	Rancho Bosque	Walkthrough with School Group
2/28/2019	Interview	Rancho Bosque	Interview with Apprentice (Cows, Sheep)
2/28/2019	Interview	Rancho Bosque	Interview with Apprentice (Cows)
3/1/2019	Presentation	Rancho Bosque	Talk with Resident (Pigs)
3/4/2019	Participant Observation/Other	Rancho Bosque	Talk with Resident
3/5/2019	Interview	Huehuecoyotl	Interview with Founder
3/5/2019	Interview	Huehuecoyotl	Interview with Founder
3/5/2019	Walkthrough	Huehuecoyotl	Visit to Huehuecoyotl
3/22/2019	Interview	Rancho Bosque	Interview with Volunteer
3/26/2019	Walkthrough	Aldea Ceiba	Tour with Resident
3/29/2019	Workshop	Aldea Ceiba	Bee Workshop
4/2/2019	Interview	INECOL	Interview and Lab Tour
4/2/2019	Interview	Aldea Ceiba	Group Interview

4/7/2019	Interview	Aldea Ceiba	Interview, Visitor
4/7/2019	Interview	Aldea Ceiba	Interview, Visitor
4/9/2019	Interview	Aldea Ceiba	Interview, Volunteer
4/11/2019	Walkthrough	Aldea Ceiba	Walkthrough, Watering Area
4/11/2019	Workshop	Aldea Ceiba	Mapping Workshop, Aldea Ceiba
4/12/2019	Workshop	Aldea Ceiba	Workshop, Volunteer
4/14/2019	Participant Observation/Other	Aldea Ceiba	Lecture, Visitor
4/14/2019	Interview	Aldea Ceiba	Interview, Volunteer
4/14/2019	Walkthrough	Aldea Ceiba	Walkthrough, Watering Area
4/16/2019	Interview	Aldea Ceiba	Interview, Volunteer
4/18/2019	Interview	Aldea Ceiba	Interview, Volunteer
4/19/2019	Interview	Aldea Ceiba	Interview, Resident
4/19/2019	Participant Observation/Other	Aldea Ceiba	Interview, Resident
4/20/2019	Interview	Aldea Ceiba	Interview, Founder
4/21/2019	Interview	Aldea Ceiba	Interview, Founder
4/21/2019	Interview	Aldea Ceiba	Interview, Founder
4/21/2019	Participant Observation/Other	Aldea Ceiba	Workshop Feedback Session
4/23/2019	Interview	Aldea Ceiba	Interview, Founder
4/24/2019	Festival/Conference	Aldea Ceiba	Workshops, Community Festival
4/25/2019	Interview	Aldea Ceiba	Interview, Founder
4/27/2019	Festival/Conference	Las Canadas	Festival at Las Canadas
4/28/2019	Interview	INECOL	Interview, Scientist
5/5/2019	Workshop	Xalapa Botanical Gardens	Workshop, Staff
5/9/2019	Interview	INECOL	Interview, Staff Scientist
5/13/2019	Festival/Conference	ECOSUR	Agroecology Conference at ECOSUR
5/19/2019	Walkthrough	Biodynamic Farm, Veracruz	Tour of Biodynamic Community near Rancho Bosque, Interview
5/23/2019	Interview	Eco Rancho	Interview with Owner of Eco Rancho
5/23/2019	Interview	Eco Rancho	Interview with Eco Rancho resident

5/23/2019	Interview	Eco Rancho	Interview with Eco Rancho residents
6/4/2019	Interview	University of Guadalajara	Expert Interview (Professor, Ecovillages)
6/11/2019	Interview	EcoMonte	Interview with Resident
6/12/2019	Interview	EcoMonte	Interview with Founder
6/14/2019	Interview	Eco Community in Jalisco	Interview with Founder (Community in Formation)
7/7/2019	Participant Observation/Other	Shambhala	Visit to Eco Community, Guanajuato
7/11/2019	Walkthrough	Aldea Ceiba	Walkthrough, Festival
8/31/2019	Interview	Tierra Madre	Interview with Worker
9/4/2019	Interview	Tierra Madre	Interview with Resident
9/11/2019	Interview	Tierra Madre	Interview with Founder
9/12/2019	Interview	Tierra Madre	Interview with Resident
9/15/2019	Interview	Tierra Madre	Interview with Resident
9/18/2019	Festival/Conference	Botanical Gardens, San Miguel	Biodynamic Association Conference, Guanajuato
9/19/2019	Interview	Biodynamic Association Conference	Interview with Resident (Rancho Bosque)
9/20/2019	Interview	Biodynamic Association Conference	interview with Conference Speaker
10/4/2019	Walkthrough	Aldea Ceiba	Walkthrough, Founder
10/5/2019	Walkthrough	Aldea Ceiba	Class, Founder
10/7/2019	Participant Observation/Other	Aldea Ceiba	Compost Class, Founder
10/12/2019	Walkthrough	Aldea Ceiba	Community Tour, Founder
10/12/2019	walkthrough	Aldea Ceiba	Garden Tour, Founder
10/12/2019	Participant Observation/Other	Aldea Ceiba	Morning Circle at Aldea Ceiba
10/12/2019	Walkthrough	Aldea Ceiba	Community Tour (Seedling House), Founder
10/12/2019	Walkthrough	Aldea Ceiba	Founder Talk (Meliponario)
10/18/2019	Interview	Aldea Ceiba	Interview with Visitor
10/21/2019	Interview	Aldea Ceiba	Interview with Visitor
10/21/2019	Interview	Aldea Ceiba	Interview with Volunteer
10/21/2019	Interview	Aldea Ceiba	Interview with Community Member
10/22/2019	Walkthrough	Aldea Ceiba	Revisions of Beehives
11/6/2019	Interview	Aldea Ceiba	Revisions of Beehives

11/8/2019	Walkthrough	Aldea Ceiba	Walkthrough, Syntropic Garden
11/8/2019	Interview	Aldea Ceiba	Interview with Volunteer
12/1/2019	Interview	Eco Community, Jalisco	Phone Interview with Founder

Appendix C. Research Timeline

October 2014: Research Scoping Trip (Jalisco)
June–July 2018: Research Scoping Trip (Yucatán, Veracruz)
December 2018–early March 2019: Fieldwork, Rancho Bosque, Veracruz
Early March 2019: Visit to Huehuecoyotl ecovillage community, Morelos
mid-March–late April 2019: Fieldwork, Aldea Ceiba, Yucatán
end April–early May: follow up visit and interviews, Veracruz
mid May 2019: Agroecology Conference, ECOSUR, Chiapas
late May– June 2019: Site Visits in Jalisco
July 2019–mid September 2019: Fieldwork, Tierra Madre, Morelos
mid-September–Biodynamic Festival, Guanajuato
late September–late November 2019: Fieldwork, Aldea Ceiba, Yucatan

Appendix D. Interview Guide

Interview Guide

Residents (if applicable)

Background

How did you come to live at <ecovillage site>? What would you say brought you here?

What makes <ecovillage site> different from where you used to live?

- socially? geographically? ecologically?

Can you describe the goals of your community? What motivates this project?

What does sustainability mean to you? What is sustainable/not sustainable about this community?

Who or what do you interact with most on a daily basis?

- What things are you responsible for? Do you enjoy working with <x>? Why or why not?

Do you have a particular role in the community? What kinds of tasks do you do here?

- Where did you learn how to do x? Who taught you?
- What's your favorite task or activity here? Least favorite? Why?

Knowledge

- What did you know about <region, area> before coming here?
- Has living in <ecovillage> changed your understanding of this area? In what ways?
- Has living in <ecovillage> changed how you approach your role as [x]?
- Do you attend any workshops/exchanges/festivals outside of <ecovillage>? For what purpose? Have you learned anything new through these connections?
- What was your experience level in <gardening, building, livestock, etc.> before coming here? How has it changed? What have you learned?
- Who do you ask when you don't know something?

Place [in walkthroughs of site]

- What are the benefits of this <place> for supporting your community? Are there any challenges? If so, what are they?
- Which things in this space <plants, birds, insects, etc.> are from here (native, "belong")? Are there any <things> that don't belong here? Why not? Where did they come from?
- How has this place <ecovillage, area, region> changed since you first arrived? What elements have transformed the space the most?
- How do you feel about living here? [explain]
- What area(s) do you spend the most time in? What area(s) do you spend the least time in? Why?

Visitors/Volunteers

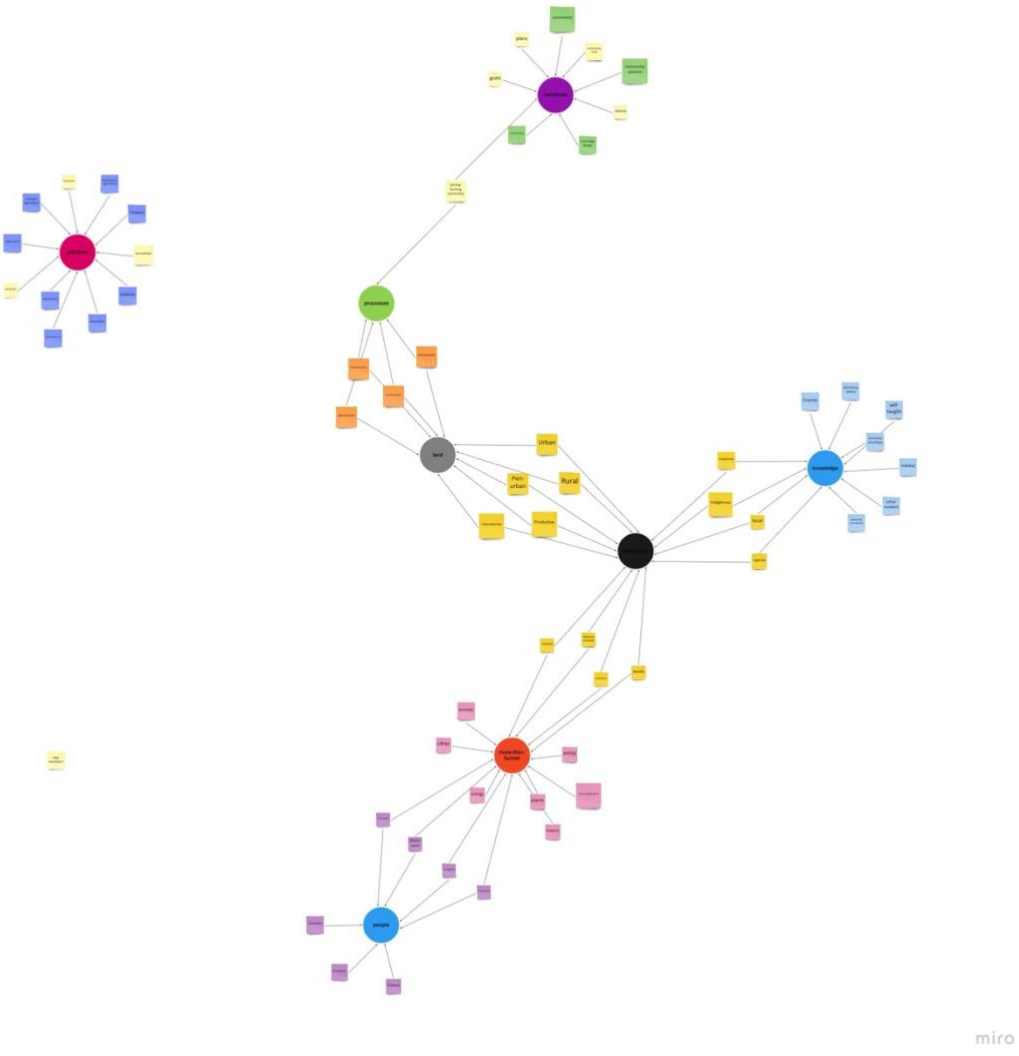
- Before living at <ecovillage site>, have you ever visited another ecovillage before?
    - Where, when?
    - What was that experience like? In what ways was it different than here?

Founders

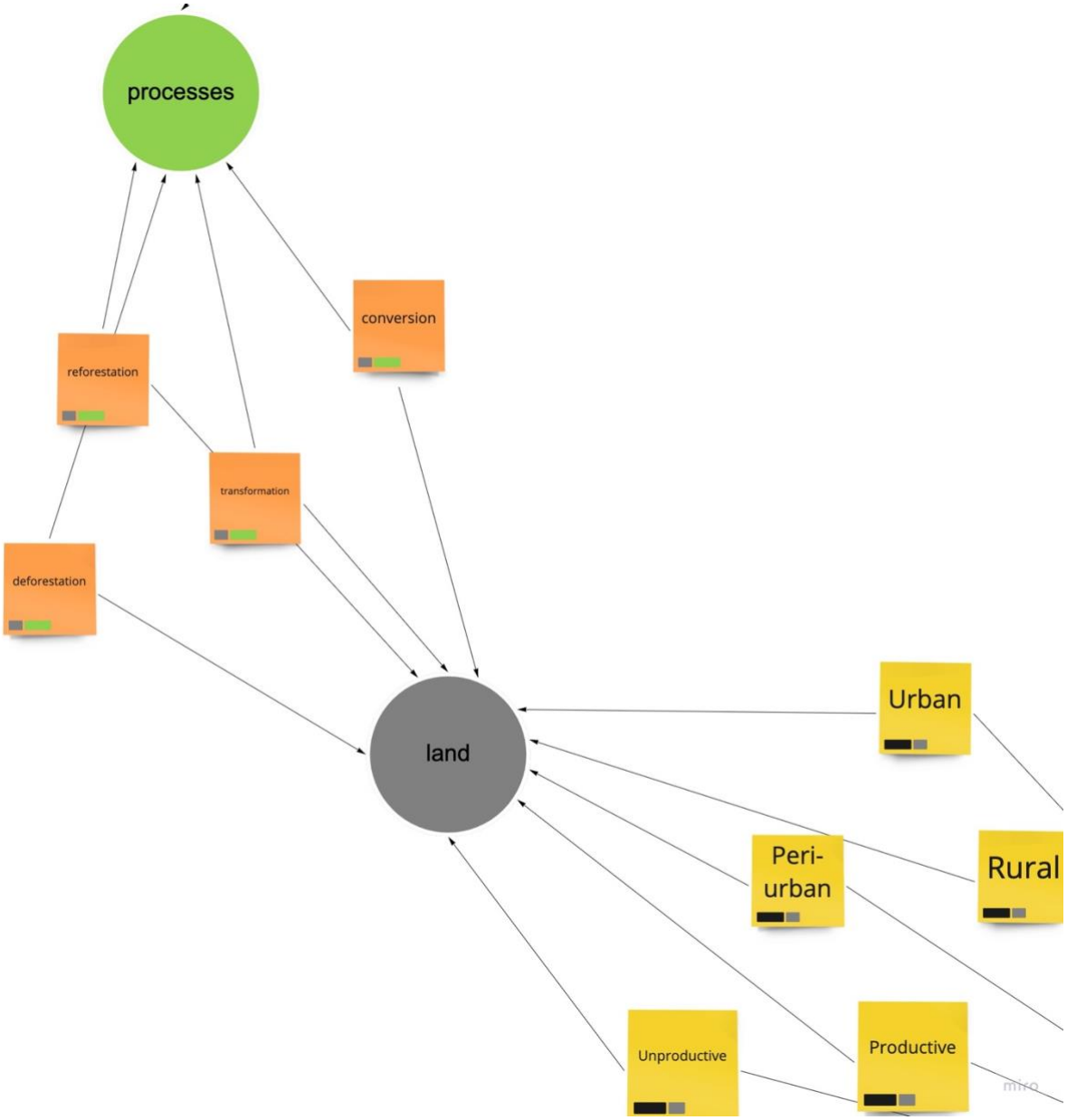
- What is your relationship with volunteers and visitors like?
    - Have you learned anything from volunteers or visitors here? (Explain)
- What is your relationship with the local/nearby community?
    - Have you learned anything from them? (Explain)

Appendix E. Coding Scheme

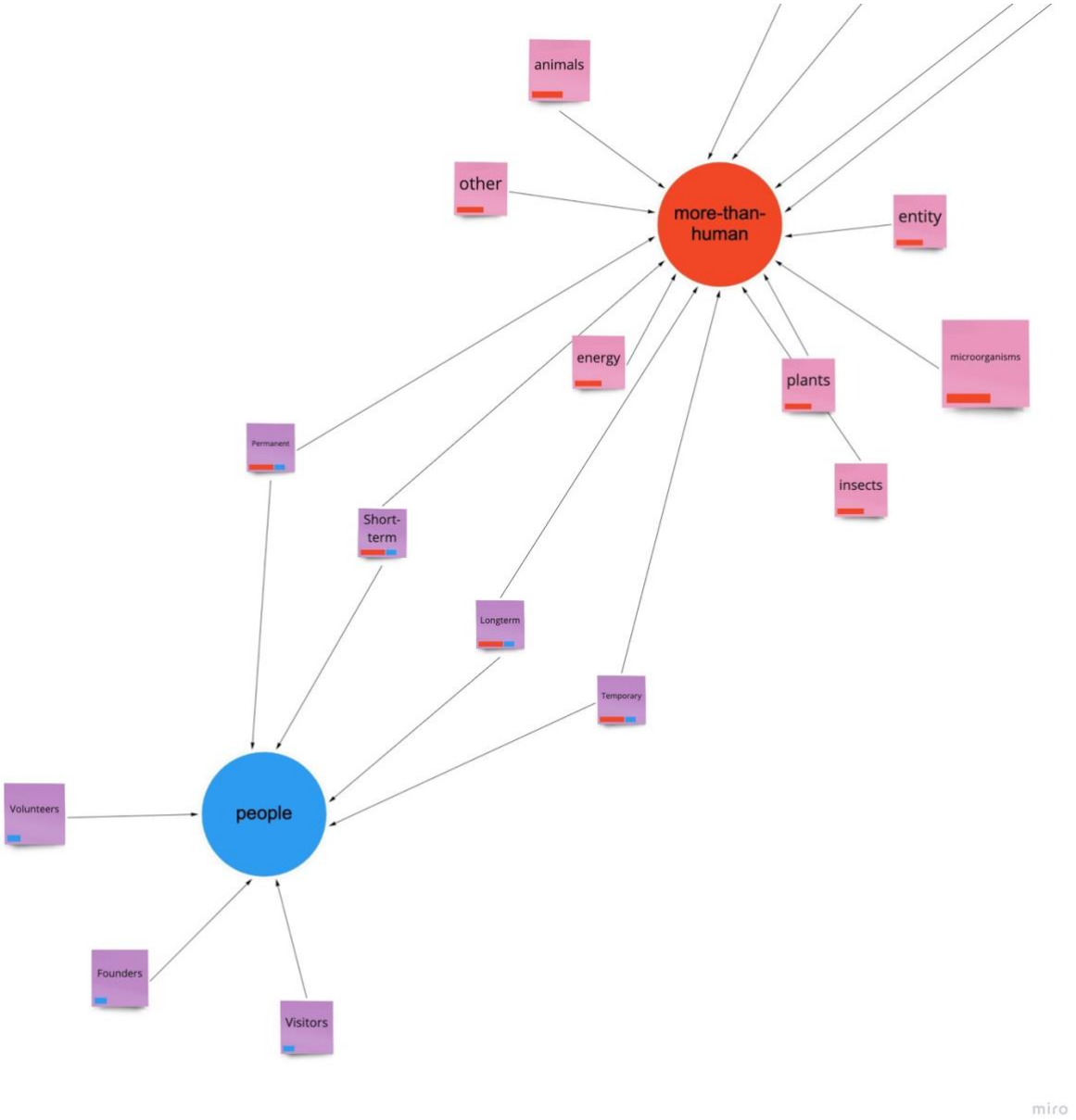
The following items are selected screenshots of tags and codes used to categorize interview data. The full coding scheme network was compiled using a navigable interface in Miro, as well as hosted locally on a server in the form of raw data; both can be accessed on request.



Item 1. Coding scheme represented as a network of overlapping tags.



Item 2. Close-up of section of coding diagram, showing tags associated with land.



Item 3. Close up of coding diagram, showing overlap of tags between people and more-than-human others.

Appendix F. Species List

Scientific Name	Common Name	Common Name (2)	Research Area	Chapter
Enterolobium cyclocarpum	Guanacaste		Yucatan	Chapter 4
Brosimum alicastrum	ramón	óox	Yucatan	Chapter 4, Chapter 7
Phyllophaga sp.	"Gallinas ciegas"		Morelos	Chapter 5
Eichhornia crassipes	water hyacinth		Morelos	Chapter 5
Canis lupus familiaris	several breeds:	xoloitzcuintli, golden lab, chihuahua	Morelos	Chapter 5
Ruta graveolens	Ruda	Rue	Morelos	Chapter 5
Chenopodium nuttalliae	Huauzontle	Hairy Amaranth	Morelos	Chapter 5
Ipomoea arborescens	casahuate	morning glory tree	Morelos	Chapter 5
Rubus fruticosus	blackberry		Morelos	Chapter 5
Rubus idaeus	raspberry		Morelos	Chapter 5
Hermetia illucens	black soldier fly		Yucatan	Chapter 6
Pouteria sapota	mamey		Yucatan	Chapter 6
Dives dives	el pich		Yucatan	Chapter 6
Setophaga citrina	Chipe encapuchado		Yucatan	Chapter 6
Eciton sp.	army ants(?)	xulab	Yucatan	Chapter 6
Sechium edule	Chayote		Veracruz	Chapter 6
Ceiba aesculifolia	Ceiba	*pochote*	Yucatan	Chapter 6
Ceiba pentandra	Ceiba		Yucatan	Chapter 6
Xylocopa mexicanorum	Carpenter bee	"Robber bee" (*abeja ladrona*)	Yucatan	Chapter 6
Lestrimelitta niikib	Limon kaab	Lemon bee	Yucatan	Chapter 6
Plebeia frontalis	Aj chi'		Yucatan	Chapter 6
Euglossa sp.	abeja orquídea	orchid bee	Yucatan	Chapter 6
Scaptotrigona pectoralis	Ak tun kap'		Yucatan	Chapter 6
Azadirachta indica	neem		Yucatan	Chapter 6
Sus scrofa	Jabalí	wild boar	Veracruz	Chapter 6
Coffee arabica	coffee		Veracruz	Chapter 6

Yucca gigantea	yucca		Veracruz	Chapter 6
Acacia farnesiana	huizache		Veracruz	Chapter 6
Citrus aurantifolia	lime	limón criollo	Yucatan	Chapter 6
Varroa jacobsoni	varroa mite		Yucatan, Veracruz	Chapter 6
Cocos nucifera	coconuts		Yucatan	Chapter 6
Aethina tumida	small hive beetle		Yucatan, Veracruz, Morelos	Chapter 6
Trigona fulviventris	Mu'ul kab		Yucatan	Chapter 6
Panicum maximum	Mombasa		Yucatan	Chapter 6
Meleagris gallopavo	Turkey		Yucatan	Chapter 7
Anas platyrhynchos domesticus	Domestic duck		Yucatan	Chapter 7
Melipona beecheii	Queen Bee	Xunaán kaab	Yucatan	Chapter 7
Apis mellifera	European honeybee	Abeja americana	Yucatan	Chapter 7
Piscidia piscipula	jabim	Fish Poison Tree	Yucatan	Chapter 7
Gymnopodium floribundum	dzidzilche		Yucatan	Chapter 7
Lonchocarpus longistylus	Balché		Yucatan	Chapter 7
Agave fourcroydes	Henequen		Yucatan	Chapter 7
Bursera simaruba	Chaká	Gumbo Limbo	Yucatan	Chapter 7
Metopium brownei	Chechem		Yucatan	Chapter 7
Viguiera dentata	tajonal		Yucatan	Chapter 7
Gliricidia sepium	sac yab		Yucatan	Chapter 7
Apis mellifera scutellata	Africanized honeybee		Yucatan	Chapter 7
Pseudohypocera kerteszi	phorid fly	nenem	Yucatan	Chapter 7
Triatoma infestans	kissing bug	chinche	Yucatan	Chapter 8
Bubulcus ibis	Garza boyera	cattle egret	Veracruz	Chapter 8
Haemonchus contortus	barber pole worm		Veracruz	Chapter 8
Dichotomius estercoleros	dung beetles (digger type)	*escarabajos estercoles; cavadores (diggers)*	Veracruz	Chapter 8
Haemonchus contortus	barber pole worm		Veracruz	Chapter 8

Trichostrongylus sp.	nematode		Veracruz	Chapter 8
Cynodon nlemfuensis	African Bermuda grass	*pasto estrella*	Veracruz	Chapter 8
Cnidoscolus aconitifolius	chaya	tree spinach	Yucatan	Chapter 8
Guazuma ulmifolia	pixoy		Yucatan	Chapter 8
Cnidoscolus angustidens	*mala mujer*		Veracruz	Chapter 9
Ovis aries	sheep		Veracruz	Chapter 9
Sus domesticus	pig		Veracruz	Chapter 9
Bos taurus	cow		Veracruz	Chapter 9

Appendix G. Relevant Site Documents

Que la humanidad está en deuda con los pueblos originarios del mundo, guardianes del conocimiento y prácticas que han creado y sostenido a la civilización. Por lo que es crucial conservar la sabiduría de nuestros ancestros.

Que la diversidad biológica y cultural es la fuente de la abundancia. Por eso, la libertad de ser y expresar es la clave para producir riqueza.

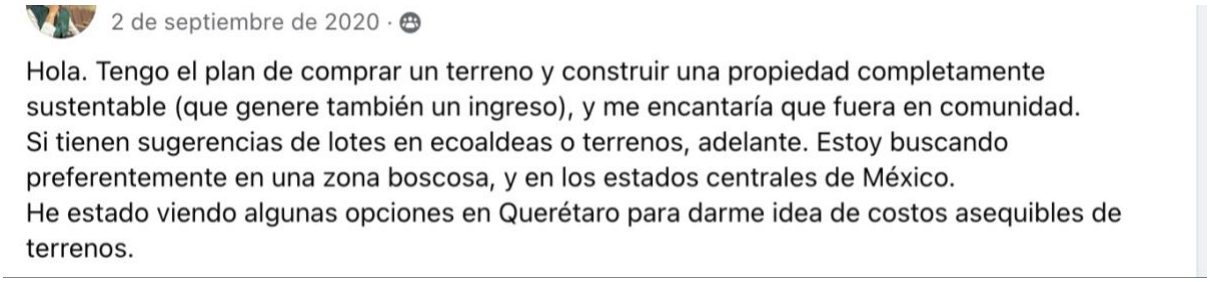
Que la libre determinación de los pueblos indígenas de México y el mundo es una causa justa y necesaria para restablecer el equilibrio.

Que es un deber generacional proteger y reproducir las semillas nativas libres de agroquímicos.

Que trabajar al aire libre y poner las manos en la tierra es sanador y todos los jóvenes y niños deben tener la oportunidad de redescubrir la capacidad formativa de cultivar.

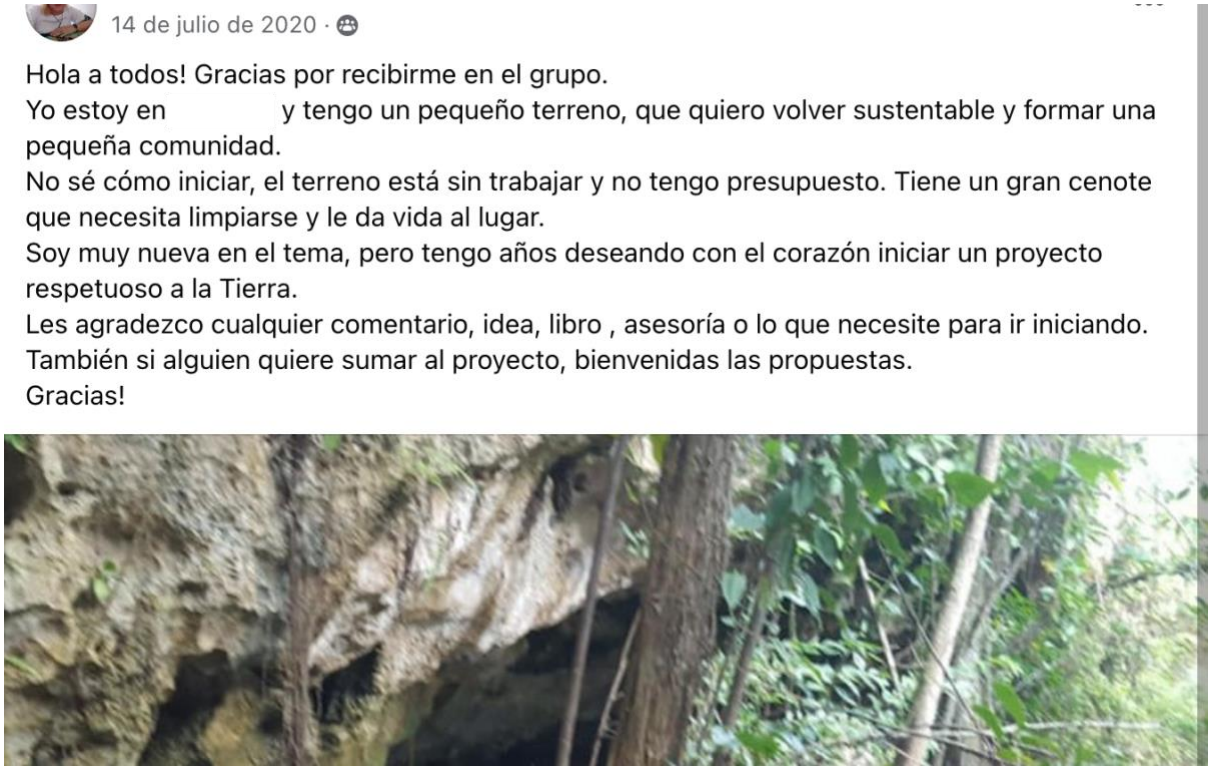
Que las campesinas y campesinos del mundo merecen la gratitud de la especie por haber cuidado y cultivado la tierra con esfuerzo y sabiduría para alimentarnos hasta el día de hoy.

Item 4. Selection of Aldea Ceiba's Manifesto [Spanish version], posted on the community's website.


2 de septiembre de 2020 ·

Hola. Tengo el plan de comprar un terreno y construir una propiedad completamente sustentable (que genere también un ingreso), y me encantaría que fuera en comunidad.
Si tienen sugerencias de lotes en ecoaldeas o terrenos, adelante. Estoy buscando preferentemente en una zona boscosa, y en los estados centrales de México.
He estado viendo algunas opciones en Querétaro para darme idea de costos asequibles de terrenos.

Item 5. Post in Facebook group dedicated to searching for active ecovillages in Mexico that are accepting new members.



Item 6. Post in Facebook group dedicated to searching for groups to form an ecovillage community in Mexico. The poster describes their desire to form a small community on a plot of land that they own.

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