Commoning the bloom? Rethinking bee forage management in industrial agriculture

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Managed and wild bee populations are declining around the world, in part due to lost access to bee forage (i.e., nectar and pollen). As bee forage diminishes, the remaining acres become sites of contestation between beekeepers, land managers, ecologists, and regulatory agencies. This article applies a commons framing to contextualize these conflicts and attempts to resolve them. Drawing from the concepts of commons and commoning, I argue that nectar and pollen are common-pool resources for pollinators, beekeepers, and land managers, currently managed through varied access arrangements such as informal usufruct rights and pseudo-commoning practices. Like commoning, pseudo-commoning aims to collectively manage a resource through a set of protocols that involve equitable resource sharing and communication. However, because pseudo-commons are implemented from the top down, for example, from institutional actors driven in part by economic interests, they often do not result in widespread adoption on the ground. Through a case in California almond orchards, I make two additional arguments. First, because beekeepers are largely migratory and do not own the land they need for production, their subordinate position to landowners can challenge equitable bee forage management. Second, while floral pseudo-commons may aim to counter the negative effects of industrialized agricultural production (e.g., by limiting pesticide exposure to honey bees), they also provide a “fix” that supports and expands industrial agriculture by stabilizing managed bee pollination services. Increasing reliance on managed bee pollination services can thus disincentivize transitions to sustainable food production, such as adopting diversified practices that would support native bee populations and reduce the need for managed honey bees on farms.

Keywords: Commons, Bee forage, Honey bees, Pesticides, Beekeeper, Sustainable agriculture

Introduction

Managed and wild bee populations are declining around the world, a phenomenon that threatens the stability of U.S. agroecosystems and food security (van der Sluijs and Vaage, 2016). About one-third of global crop production relies on animal pollination (Klein et al., 2007), and insect pollination specifically provides an estimated economic value of around US$15 billion a year in pollination services (Calderone, 2012). Commercial beekeepers play a key role in the provision of honey bee pollination services to U.S. crops (Calderone, 2012). Yet, commercial beekeepers also struggle with annual colony losses of approximately 40% due to a variety of causes (Kulhanek et al., 2017, p. 334), including agrochemicals (Johnson et al., 2010; Mullin et al., 2010; Zhu et al., 2014), the parasitic Varroa destructor mite (DeGrandi-Hoffman et al., 2014; Seeley and Smith, 2015), pests and diseases (Berthoud et al., 2010), and habitat and forage loss (Goulson et al., 2015).

Commercial beekeepers argue that these losses are unsustainable and that only loss rates closer to 16.5% or lower would be acceptable (Kulhanek et al., 2017). Given the role of forage loss in bee vulnerability, the safety, diversity, and abundance of floral resources (or bee forage, as it is commonly termed in relation to bees) have become important points of investigation, explored through research on changes in land use and landscape composition and its impact on bee health (Otto et al., 2016; Smart et al., 2016; Dolezal and Toth, 2018; Kuchling et al., 2018). A number of factors drive bee forage loss in the United States, such as urbanization and the building of infrastructure, but two of the main factors have been the loss of flower-rich grasslands and increased monoculture crop production (Goulson et al., 2015; Hellerstein et al., 2017).

Beekeepers already have tenuous access to land; most commercial beekeepers do not own the land they need for production and must obtain and maintain access to privately owned land to produce honey and/or fulfill pollination contracts (Durant, 2019a). As access to nonagricultural bee forage diminishes and beekeepers increasingly rely on agricultural pollination, beekeepers and other stakeholders (e.g., landowners and managers, ecologists, pesticide applicators) experience heightened
conflicts over forage access and pesticide use (Durant, 2019a).

To help contextualize bee forage conflicts between beekeepers and industrial farmers and provide a framework for approaches to increase bee access to healthy forage, I draw from literature on common-pool resources (CPRs), commons, and commoning. Ostrom (1990) defined CPRs as those whose size or characteristics make it difficult to exclude beneficiaries from accessing and using them but which also face problems of depletion, such as fisheries, irrigation systems, open range grazing systems, and the nectar and pollen in floral landscapes. Commoning can help resource users create access arrangements that require members to use resources equitably and sustainably and is often framed as a counter-capitalist strategy (Caffentzis and Federici, 2014; Bollier, 2016). Yet, commons can also occur within or in support of capitalist production as a “commons fix” (De Angelis, 2013), a “capitalist commons” (Caffentzis, 2011), “commons-like institutions” (Turner, 2017), or “pseudo-commons” (Theesefeld, 2019). One purpose of these delineations is to highlight how market actors and institutions can co-opt the communities, language, and processes of commons and commoning to perpetuate capitalist forms of production.

Building on these debates, my article makes four key arguments. First, I draw on theories of access (Ribot and Peluso, 2003) and usufruct rights (Fortmann, 1990) to provide background on beekeeper and bee mobility and how this creates the need for unique forms of access to bee forage. Because beekeepers are largely migratory and do not own the land they need for production, I argue that their subordinate position to landowners can challenge equitable floral resource management and genuine commoning. Second, I engage literature on the commons and commoning to position nectar and pollen as CPRs for bees, beekeepers, and land managers, currently managed through varied access arrangements and property regimes. The floral resources that honey bees rely on for honey production are rarely produced as a commodity and are freely available to any pollinator that can access it. However, these resources are also subject to enclosures and exclusions that threaten to reduce beekeeper access (Durant, 2019a). Beekeeper and bee mobility thus create the need for unique forms of resource management such as commoning.

I then draw from the concepts of “pseudo-commons” (Theesefeld, 2019) and the “commons fix” (De Angelis, 2013) to propose “pseudo-commoning” as a useful analytical to the case of bee forage. Like commoning, pseudo-commoning aims to collectively manage a resource through a set of protocols that encourage equitable resource sharing and communication. However, because pseudo-commons are implemented from the top down, for example, from institutional or market actors, they often do not result in widespread adoption on the ground. While pseudo-commoning may aim to counter the negative effects of industrialized agriculture (e.g., limiting bees’ exposure to pesticides), it is a not comprehensive foil to capitalist production. Indeed, pseudo-commons often serve to perpetuate industrial production by providing a “fix” that helps maintain it (e.g., by stabilizing vulnerable pollinator populations for agricultural production). For example, unless farmers integrate native bee populations into their farm practices, they will likely be continuously reliant on managed bees to produce their crops, a reliance on a vulnerable pollinator and external input that stifles transitions to sustainable agriculture.

I ground these dynamics in a case in the California almond industry that highlights the industry’s efforts to have their farmers manage almond floral resources through “Honey Bee Best Management Practices” (Bee BMPs). These Bee BMPs are some of the most strident efforts taken by an agricultural industry to protect bees during bloom, and their efforts are also providing a model for almond production in other countries (Almond Board of Australia, 2020). However, beekeepers’ subordinate position as migratory producers (which can challenge their ability to advocate for bee-friendly practices), farmers’ regional operational challenges (which can limit their ability to adopt certain practices), and the fact that the Bee BMPs’ efforts are being disseminated largely through top-down mechanisms (rather than emerging from a collaboration between beekeepers and farmers) all likely play a role in lagging adoption on the ground.

The data informing this article come from in-depth, semi-formal interviews with over 75 beekeepers and almond farmers as well as participant observation at conferences and industry meetings (with both industries) from 2012 to 2019. The article was also informed by over 15 interviews with County Agricultural Commissioners (CACs) and state and federal regulators, as well as two qualitative studies led by the author on pesticide use and the Almond Board’s Bee BMPs, the methods of which can be found in two publications (Durant et al., 2021; Durant and Ponisio, 2021). Finally, a note about terms: I use floral resources and bee forage interchangeably throughout the article depending on the context, both of which refer to floral nectar and pollen. I also refer to “almond growers” (as they are typically termed by the industry) as “almond farmers” throughout the article because a “farmer” is the more common term for an agricultural producer in the literature I engage with in this article.

Background: Usufruct rights and beekeeper forage access arrangements
Managed bees provide essential pollination services to U.S. agriculture through a socioeconomic system that hinges on beekeepers’ ability to access bee forage on land they do not own, through a variety of often-tenuous access arrangements. Access, defined as “the ability to benefit from things—including material objects, persons, institutions, and symbols” (Ribot and Peluso, 2003: 153), is less about the right a user has to a resource than their ability to maintain access to it. One type of access arrangement central to supporting beekeeper livelihoods is the system of informal usufruct rights, a resource management approach that can occur on private, publicly owned, and common lands.
Usufruct rights arrangements occur when resource users have the right to “use and enjoy the profits and advantages of something belonging to another” (Rieser, 1997, p. 820). In other words, one entity (e.g., a landowner or public land manager) holds the right to manage (and exclude or alienate), while the other (e.g., a beekeeper) holds the rights of access and use. Arrangements such as these frequently occur on public lands where users are able to collect firewood from public forests (Fortmann, 1990), fish stocks from government-owned and managed fisheries (Rieser, 1997), or hunt or gather honey in public forests (Yiannopoulos, 1967; Watson, 2016). Usufruct rights on private land are rarely recognized formally in the United States; however, informal and customary access claims are widespread and are often the subject of land and resource access disputes (Fortmann, 1990; Fairfax et al., 1999).

Beekeepers’ efforts to secure and maintain access to forage on privately owned land offer an example of informal usufructuary access arrangements in the United States. Honey bees require food year-round, so migratory beekeeping requires the constant movement of anywhere between tens to thousands of colonies to follow geographic patterns of nectar flow (Jabr, 2013). Because plants only bloom for certain periods, migratory beekeepers must constantly ship their bees to new sites throughout the year to access sites for honey production or provide pollination services (see Figure 1 for sample migratory routes, or Bond et al., 2021). Beekeepers do not typically own the land they use to maintain their bees, so this cross-country movement requires beekeepers to constantly manage social relationships with landowners and managers to maintain access to forage landscapes, as well as multiscaled bureaucracies, local beekeeping laws, and geographic constraints (Durant, 2019a). These access arrangements are reminiscent of U.S. “open range” practices through the 1800s, which considered all unfenced land, regardless of use and ownership, open for cattle grazing (Andes, 2001). Once beekeepers have obtained access to an apiary site by navigating these varied relationships, their bees can fly an average of a half-mile radius up to around four miles (Couvillon et al., 2015), obtaining available forage on any property within this range.

Honey bees do not observe property lines, and thus it is quite difficult to exclude them—or any pollinator—from a given landscape and the forage embedded within. Because bees are small and cannot be branded or marked like other livestock, it is also difficult to know when bees are “trespassing” on land they do not technically have access to (Durant, 2019a). The question of whether or not honey bees were “trespassers” has been addressed in the courts, for example, when beekeepers sued a Wisconsin...

Figure 1. Map of beekeeper migratory routes adapted by United States Department of Agriculture (USDA). Economic Research Service from Kautzmann (2011), with input from commercial beekeepers and apiculture experts, including Dr. Jeff Pettis and Dr. David Epstein, an entomologist and authority on pollinators with the USDA’s Office of Pest Management Policy. Crop production acres are from USDA, NASS, 2012 Agricultural Census, 2014. Source: (Bond et al., 2014, p. 3). DOI: https://doi.org/10.1525/elementa.2020.00105.f1
landowner over bee-toxic pesticide use that resulted in colony losses. The court determined that traditional trespass theory did not apply to bees (Bennet v. Larson Co., 1984):

*Bees are by nature foragers that fly to and from the fields wherever there is nectar and pollen. There are no means to keep them from foraging, except for short periods of time, and there is no way for land possessors to prevent bees from entering their property.* (Bennet v. Larson Co., 1984)

In other words, while beekeepers must obtain access to place their colonies on a property, the bees themselves can largely “graze” on any forage within the flight range of their colonies, and landowners/managers must erect some kind of barrier (e.g., netting or greenhouses) to keep the bees out if they do not want them to access the property.

So, if honey bees are not trespassers on farms, then what are they to agriculture? One might argue that they are insect “laborers” that provide an economic service to agriculture as both pollinators and honey producers. The decision to allow bees access to forage (or to force the farmer to net their trees to exclude them rather than relocating hives) thus reflects honey bees’ economic value to industrial agriculture and underscores the real motivation to protect access to bee forage. Managed bees have become highly valued in agriculture for a number of reasons. Monoculture farming has played a role in diminishing unmanaged native pollinator populations (Kremen, Williams, et al., 2002; Kremen, Bugg, et al., 2002; Saunders, 2016), thus deepening industrial agriculture’s dependence on managed honeybee pollination services in what has been termed the “apis-industrial-complex” (Nimmo, 2015).

Honey bees fit naturally into an agricultural business model where producers purchase inputs instead of relying on natural ecosystem services (Kremen and Chaplin-Kramer, 2007). Colony management is well-developed and fairly reliable, managed honey bees are largely available any time crops are blooming, honey bees can pollinate a large number of crops and have extended foraging ranges that make them suitable for large monocultures, and honey bee colonies are easily transportable by truck to agricultural lands around the United States (Calderone, 2012, p. 22). These dynamics have occurred alongside an overall decline in honey yields and honey production income that has motivated beekeepers to obtain a higher portion of their annual income from commercial pollination (Ferrier, 2019). In the past, migratory beekeepers moved their colonies for honey production, which provided the bulk of their income, and farms also relied more heavily on native bee populations to provide pollination services (Durant, 2019b, p. 28–41). However in 2016, beekeepers earned over 41% of their income from pollination services in 2016 (Lee et al., 2017), and this percentage likely rises each year.

Honey bees’ value to agriculture is also reflected in a number of state and federal programs and statutes, such as California’s Notice of Intent (NOI) program and Right to Farm statutes. The NOI program requires farmers to give all registered beekeepers within one mile of an application site a 48-h notice if they intend to apply any labeled bee-toxic pesticides to a blooming crop (3 CCR § 6654 Notification to Beekeepers, 2001). Beekeepers can then discuss the application and negotiate a time or potentially a different type of pesticide that is less bee toxic. Right-to-farm statutes began in the 1970s to stop urban sprawl and combat nuisance lawsuits that could emerge as urban development overtook existing farmland (Phillips, 2008).

California’s Right to Farm Act was enacted in 1981. The legislature determined that any agricultural activity conducted for commercial purposes cannot be deemed a private or public nuisance if the “agricultural activity” has been operating at least three years and “was not a nuisance at the time it began” (Cal. Civ. Code § 3482.5, 2001). This has helped beekeepers maintain access to forage sites, even when bee pollination might be a nuisance, for example, if the forage site were near a seedless crop that would become seeded with bee pollination. If the beekeeper had established the forage site more than three years prior, they would be able to maintain it, even if the producer did not want them there.

Despite the existence of informal usufruct rights, statutes, and state programs, beekeepers’ access to bee forage is still quite tenuous and becoming increasingly so. Beekeepers have historically accessed floral resources through commercial pollination services, rental payments, or through gifts, where beekeepers give landowners jars of honey and fruit to obtain and maintain access to land for honey production (Durant, 2019a). Beekeepers are socially vulnerable in either of these contexts, as they are rarely the owner of the property they rely on for forage access and are thus subject to whatever land use practices the landowner or manager employs while the beekeeper is on site.

All of this underscores the role that obtaining forage access plays in beekeepers’ ability to maintain their livelihoods, the tenuous nature of that access at most forage sites on private land, and the social inequalities that can cement as a result. Ribot and Peluso (2003) note that some people and institutions control resource access, while others maintain their access “through those who have control” (p. 154). While beekeepers may be able to negotiate the conditions of their access, they are rarely in control of the environment they keep their bees in. Even in formal usufruct scenarios, the owner of the resource (either a private landowner or the government) can expropriate the resource or choose not to renew rights in the future (Rieser, 1997). This awareness—that the landowner can revoke access to bee forage at any moment for any reason—shapes how beekeepers interact with farmers and underscores the power asymmetry between the landowner/manager and themselves. This dynamic is then heightened in an industrial agriculture context, where a farmer’s primary objective is typically to protect their crop from pest pressures to maximize profit. The crop is thus the primary concern, and the farmer may manage the land in ways that are detrimental to bees (e.g., pesticide
applications or the removal of wild pollinator forage) in service of the crop. It also highlights the potential challenges beekeepers and farmers face in creating horizontal and equitable forage management regimes, which I elaborate on in the following section.

A theory of bee forage access conflicts and mitigation solutions

One of the key contributions of this article is to provide a theoretical framework to understand conflicts over bee forage in the United States and solutions to these conflicts as well. Given the mobility of bees and beekeepers and the unique availability of most floral resources, literature on the commons and commoning provides a helpful lens. Ostrom’s (1990) research on CPRs, and the body of commons and commoning research that has followed, helped delineate commons from open access resources (resources without access protocols or rules) and also made a case for other resource management strategies besides Hardin’s (1968) binary solution of either privatization or regulation.

Ostrom defined CPRs by two primary characteristics. The first is their “subtractability,” meaning that if one user overextracts the resource, it takes away from other users’ ability to access that resource (Ostrom et al., 1999, p. 278). In other words, CPRs are depletable, and if left unmanaged and truly open access, might be susceptible to degradation or depletion over time. The other quality of a CPR is the difficulty of excludability, in the sense that it can be challenging to exclude beneficiaries through institutional and/or physical means (Ostrom et al., 1999). CPRs can include both material and nonmaterial resources (such as the internet), but for the purpose of this article, I focus on floral resources, a biophysical CPR reminiscent of other natural resources and ecosystems such as rangelands, fisheries, irrigation systems, and groundwater basins. In all of these examples, the fluidity, immense scale, movement, or ephemerality of the resource/ecosystem defy traditional property or management arrangements and challenge governance regimes.

What makes the bee forage case unique is that both bee forage and honey bees can act as CPRs, in that they are both subtractable/depletable, and it is difficult to exclude certain resource users from accessing the resource. For example, it is nearly impossible to stop a resource user (e.g., a neighboring farmer) from accessing honey bee pollination services as bees enter their property from a neighboring property, and it is similarly challenging to stop bees from accessing that same neighbor’s floral resources without the use of nets or greenhouses. As for subtractability, honey bee “subtractability” largely occurs on farms through the myriad of stressors that lead to annual colony losses and general honey bee vulnerability or death, such as from acutely toxic pesticides (Goulson et al., 2015). Forage “subtractability” on farms can occur through a myriad of ways, such as through the transition of bee forage landscapes (e.g., wild prairies with bee-friendly forage) to non-bee-friendly monoculture agriculture (e.g., corn and soy production in the Midwest) (Otto et al., 2016; Hellestein et al., 2017). Farmers can transition marginal lands that may have had bee forage into non-bee-friendly crop production (Claassen et al., 2011), remove bee forage (e.g., cover crops) and habitat on farms because of food safety concerns (Karp et al., 2015), or grow seedless varietals that require netting crops or growing crops in greenhouses to avoid pollination. Healthy forage can also be diminished through a “toxic exclusion” (Durant, 2019a, p. 164), such as through the application of pesticides, where forage is contaminated and accessing the resource would harm honey bees (David et al., 2016; Wade et al., 2019), so beekeepers avoid those areas or crops. For this article, I generally focus on the need to protect forage, so bees can access it. However, it is important to note that the resources being shared and managed among beekeepers and farmers are the bees (i.e., their pollination and honey production services) and their forage as well.

CPRs are typically held within four different categories of property regimes that often overlap and conflict with one another: (a) open-access, (b) private property, (c) state or public property, and (d) communal property (i.e., commons; Feeny et al., 1990; Bromley, 1992). These regimes are not static; resources can move in and out of property regimes or overlap with others. While these four categories are ideal, their distinctions offer analytical purchase. Open access resources are unregulated, nonprivatized, and available to everyone, such as offshore fisheries and the global atmosphere. These resources are most susceptible to overuse and depletion, and what Hardin (incorrectly) termed the commons in his “Tragedy of the Commons” (Hardin, 1998). Private property allows the individual (or group of individuals) to regulate the use of a resource and exclude others from accessing the resource. These rights are typically exclusive and transferrable, such as privately owned forests, rangelands, or agricultural lands. State property or governance gives resource rights to government apparatuses, which then make decisions about resource access and the “level and nature of exploitation” (Feeny et al., 1990, p. 4). Some examples of this include fish and wildlife in the public trust, highways, and public parks (Feeny et al., 1990, p. 5). Finally, communal property is held by a community of independent users who exclude outsiders and regulate use by members of the community. Examples of communal property can include inshore fisheries, groundwater and irrigation systems, range lands, and forests. This form of “property” is often termed a commons or common-property regime and can take many forms.

The definition of a commons (or common-property regime) varies throughout the commons literature. Commons to manage CPRs can be temporary, such as pastures that herders might access during grazing season (Wall, 2014). CPRs may also be owned by individuals or institutions that give resource users access under certain conditions, such as the usufruct rights discussed in the background section. Ostrom (1990) outlined eight principles to collectively self-govern common resources that emphasized setting clear boundaries for access, paying attention to local rules and needs, the need for accountability and accessible conflict resolution, as well as the need for regional cooperation and management. Drawing
from the example of irrigation systems, Bromley (1992, p. 14) defines a common-property regime more broadly as having (a) a well-defined group with restricted membership; (b) an asset that needs to be managed (the irrigation system); (c) an annual stream of benefits (water, an essential agricultural input); (d) a need for group management (irrigation systems are diffuse and run through varied properties); and finally, (e) a process for allocating the benefits equitably throughout the group. Others define the commons more simply, for example, “a management system that allows the resource to be held in common and does not stand for the common-pool resource per se” (Thesefeld, 2019, p. 346).

While Bromley’s framing highlights the need for collective management and protocols, the emphasis is more on managing the resource and its benefits to the group rather than the quality of the community’s process, for example, how the group’s management works and how decision-making power is distributed. Compare this to the definition of commons put forth by De Angelis and Harvie (2014, p. 280): “the commons are social systems in which resources are shared by a community of users/producers, who also define the modes of use and production, distribution and circulation of these resources through democratic and horizontal forms of governance.” This definition brings attention to the types of social relations and practices that shape commons management, with an emphasis on horizontal governance.

While these definitions vary, they underscore a key point: despite the emphasis on the materiality of CRPs and how this shapes their management, commons are not things or resources, but an activity centered on achieving and maintaining access to a resource. The term “commoning” (Linebaugh, 2008) thus brings attention to the set of “practices and performances” that create access to resources through common management (Nightingale, 2019, p. 16). These practices can be applied to any form of property, whether private, state-owned, or open access (Gibson-Graham et al., 2016). Commons are formed by the communities that sustain them and “must be produced and reproduced, negotiated and renegotiated, learned about and labored over” through commoning (Montenegro De Wit, 2017, p. 2). There are no commons, then, without the values, social practices, and social relations that any community draws on or creates to manage them.

Commoning communities are not composed of solely human actors, but by assemblages of human and more-than-human actors, social movements and government institutions, nonmarket mechanisms and markets, animate beings and inanimate beings that all iteratively produce a community (Gibson-Graham et al., 2016; Nightingale, 2019). For example, Gibson-Graham et al. highlight a commoning community that coalesced to protect an endangered wallaby that included an “unlikely mix” of a species of wallaby, farmers, conservationists, sporting shooters, researchers, government rangers, beef cattle, and a wooded grassland (Gibson-Graham et al., 2013; Gibson-Graham et al., 2016; Nightingale, 2019). The only thing this community had in common was a desire to protect an endangered species of wallaby. This highlights how commoning relations are not only sociopolitical but sociophysical as well (Nightingale, 2019). Commoning thus becomes a constant process of boundary making, of inclusions and exclusions of members who can or cannot participate in the commoning process of a given resource or commitment (Nightingale, 2019, p. 22). As a result, commoning can also lead to the “othering” and exclusion of members who have less social power, or the prioritization of certain nonhumans over others, a process explored further in the discussion section.

**Commoning versus pseudo-commoning and the commons’ capitalist stance**

One debate within the commons literature is whether to center the discussion about the commons on its relationship to capitalist production (De Angelis, 2013; De Angelis and Harvie, 2014; Caffentzis and Federici, 2014) or to center the discussion about the commons on its relationship to capitalist production (De Angelis, 2013; De Angelis and Harvie, 2014; Caffentzis and Federici, 2014) or to decenter commons and commoning from this context (Gibson-Graham et al., 2016; Singh, 2017). De Angelis and Harvie (2014) argue that the designation of “commons-within-and-for-capital and commoning-beyond-capital is in fact a razor edge that both capital and social movements must attempt to negotiate” (p. 291). The social practices inherent in commons and commoning can thus make it an effective counter to capitalist logic, privatization, and state governance regimes and provide a blueprint for a postcapitalist future: “it is either capital that makes the world through commodification and enclosures, or it is the rest of us . . . that makes the world through counter-enclosures and commons” (De Angelis, 2004, p. 61). Caffentzis and Federici (2014) also bring attention to the capitalist stance of the commons, arguing that “anti-capitalist” commons aim to transform social relations and “create an alternative to capitalism” (p. 100). Given this, anti-capitalist commons should be understood as both “autonomous spaces from which to reclaim control over the conditions of our reproduction, and as bases from which to counter the processes of enclosure and increasingly disentangle our lives from the market and the state” (p. 101). In other words, anti-capitalist commons provide the seeds for new, equitable, ways of relating beyond and outside capitalist production.

On the other hand, “capitalist” or “commodity” commons can produce commodities for the market and are driven, in large part, by a profit motive (Caffentzis and Federici, 2014). One example is the enclosed Swiss Alpine meadows cooperatively managed by dairy farmers, which become grazing fields each summer for dairy cows and support the Swiss dairy industry (p. 198). Another example is the lobster fishers of Maine who have built a communal system sharing lobster catches through creating finishing zones and imposing limits on the number of lobsters that can be caught. Each of these management regimes aims to distribute the resource (the fishery or grazing field) equitably and responsibly between the users yet is also producing commodities for the market.

Commons can also serve as a “commons fix” for capitalist production (De Angelis, 2013; De Angelis and Harvie, 2014), where resources managed through commoning
mitigate or buffer the destructive socioecological effects of capitalist production while still supporting it at the same time. The “commons fix” concept builds on the idea of “fixes” to overcome the obstacles or barriers posed by nature or society to capitalist production (Mann and Dickson, 1978; Weis, 2010). The outcome of commons fixes is not so much to provide alternatives to capital production but rather to fix a struggling “node of capital” and make it more competitive (De Angelis and Harvie, 2014, p. 290). For example, farmers have long wrestled with the problem of soil depletion. One of the earliest “fixes” in agriculture that overcame this natural barrier and boosted production was the use of nitrogen fertilizer to counter soil depletion, but this has since expanded to a wide array of external inputs such as seeds and agrochemicals such as herbicides, pesticides, and fungicides (Weis, 2010).

These fixes serve as “biophysical overrides” that increase productivity over time, but their durability is not assured because the underlying barrier still exists (Weis, 2010, p. 318). Another ecological barrier to industrialized agriculture relevant to this case is that of pollination services. As land becomes increasingly developed, and farmers industrialize production and expand in scale, native pollinator habitat and populations have subsequently decreased, while the need for pollination services in some industries has increased (Nimmo, 2015; Durant, 2019b; Ellis et al., 2020). The increase of managed honeybee pollination services has thus served as a “fix” or “override” to the loss of native bee and locally managed honeybee populations (Ellis et al., 2020).

De Angelis (2013) notes that because “neoliberalism is not about to give up its management of the world, it will likely have to ask the commons to help manage the devastation it creates. And if the commons are not there, capital will have to promote them somehow” (pp. 605–606, emphasis added). These promoted commons might be actual commons that are “co-opted” for commodity production, or I argue, they may be “pseudo-commons” as well (Theesefeld, 2019). Pseudo-commons occur when institutions create “initiatives that use the notion of commons and a blueprint of a common-property regime in an artificial nutshell,” but commoning relations do not actually function on the ground (Theesefeld, 2019, p. 346).

Using postsocialist CRP management regimes as an example, Theesefeld (2019) defines pseudo-commons as when:

... Formal rules have been implemented and an active organization has been built [to manage a resource], yet there is no collective action or bottom-up self-organization. There is either top-down management or it rather resembles an open access situation with some powerful actor to strive for personal benefits. (p. 349)

Pseudo-commons might be implemented by a government or quasi-governmental agency or organization (e.g., commodity marketing boards), by nongovernmental organizations, and/or international donors (e.g., the World Bank) seeking to apply collective management solutions to CPRs. However, despite the “pro-forma implementation of formal rules,” the de facto behavior of the members involved does not change on the ground (p. 348). These framings of commons against capitalism help contextualize class struggles and identify why commons-like communities may do little to shift capitalist (or postsocialist) social relations and empower the community members involved in commoning.

The danger of creating a commons binary (i.e., where commons are framed commons as either anti-capitalist or capitalist, pseudo or genuine) is that it can lead to an overly “capitalocentric” understanding of commoning (Gibson-Graham, 1996), where capitalism becomes the “gravitational center of meaning making” (Gibson-Graham et al., 2016). In other words, by focusing too tightly on what commons produce and their relationship to capitalism (i.e., commons as a thing), we lose sight of the important work that commons and commoning can do—an essential point to attend to (Singh, 2017, p. 754). Gibson-Graham et al. (2016) define commoning as “a relational process—or more often a struggle—of negotiating access, use, benefit, care, and responsibility” (p. 195). Commoning can take place with any type of property, not by changing ownership but by shifting how “access, use, benefit, care, and responsibility” occur (p. 196). Commoning thus involves “establishing rules or protocols for access and use, taking caring of and accepting responsibility for a resource, and distributing the benefits in ways that take into account the well-being of others” (p. 195). As such, the focus is less on how the commons relate to capitalism or what type of property regime governs the resource, but rather on the diversity of practices available for commoning varied types of property and how community members are transformed through the process of being-in-common. It also allows for the possibility that ways of relating can shift over time and that resources managed through pseudo-commons could become actual commons or vice versa.

**Pseudo-commoning as a capitalist fix**

Drawing from the concept of capital fixes (De Angelis, 2013), pseudo-commons (Theesefeld, 2019), and Gibson-Graham et al.’s (2016) definition of commoning as a “relational process . . . of negotiating access, use, benefit, care, and responsibility,” I introduce the term pseudo-commoning as a management approach and access arrangement for CPRs that can develop between stakeholders within varied property regimes. Pseudo-commoning refers to resource management protocols aiming to provide access to CPRs, protocols that have been created and prescribed largely through top-down institutions with an economic stake in the resource (e.g., via governing bodies, industry boards, or even leaders of stakeholder communities), rather than out of bottom-up self-organization. Pseudo-commoning can be instituted as the result of some collective action and protest, as a type of “commons fix” that aims to protect a particular form of production by saving a resource from damage or depletion.

At first glance, pseudo-commoning might have some overlap with collaborative governance (Ansell and Gash, 2008), a process where public agencies or institutions and
nonstate stakeholders engage in a collective decision-making process that is “formal, consensus-oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets” (p. 544). However, while the commoning protocol formation might happen through some type of collaborative governance (or a process that resembles it), pseudo-commoning focuses on what comes after the protocols are formalized and stakeholders move forward with their day-to-day interactions and management practices on the ground. Pseudo-commoning can also occur with resources that are not public assets, but rather those on private property used for commodity production, such as agricultural lands.

A key element of pseudo-commoning is that while some members of these communities may have internalized these protocols, the rules or protocols have not been widely adopted on the ground and the relations between members may not be entirely equitable. Sometimes, the lack of adoption may simply be because the protocols, which were determined institutionally and unilaterally, do not make sense for their socioecological or economic context and are thus ignored. Members are thus often not operating from a place of “taking caring of and accepting responsibility for a resource” or “distributing the benefits in ways that take into account the well-being of others” (Gibson-Graham et al., 2016, p. 195), but rather because they must follow the protocols—if they indeed follow them—or face consequences or social pressure from regulators or another governing body. They may also follow them to obtain an economic incentive such as a certification or a higher price for their commodity. This approach is thus largely antithetical to the underlying principles guiding “anti-capitalist commons,” which aim to disentangle communities and their social relations from the market and the state (Caffentzis and Federici, 2014).

On the one hand, the Bee BMPs discussed in this article provide an example of commoning-like protocols that aim to provide a counter to industrial agricultural production by protecting bees’ and beekeepers’ access to forage and limiting pesticide exposure to protect bee health. On the other hand, they also prop up the existing system by either depleted or making increasingly vulnerable.

"Pollination partners": Bee BMPs and pseudo-commoning in California’s almond bloom

Almond bloom starts right around Valentine’s Day each year, when nearly two million bee colonies are trucked to almond orchards from all over the United States to pollinate almonds in the largest managed pollination event in the world (Jabr, 2013). California produces 80% of the world’s almonds and 99% of those commercially grown in the United States (Almond Board of California, 2019). As a result, almond acreage has rapidly expanded throughout California over the past 20 years, doubling from 595,000 acres in 2000 (California Agricultural Statistics Service, 2001) to 1.3 million acres in 2018 (California Department of Food and Agriculture, 2019). Figure 2 highlights the counties where most of the acreage is grown in the state (Almond Board of California, 2019, p. 7).

Most almond trees require bee pollination during almond bloom each February through March. Because each acre of almonds requires approximately two colonies of bees (United States Department of Agriculture and Federal Crop Insurance Corporation, 2018), around two million of the nation’s bee colonies are shipped to California for pollination each year. Almond pollination comprised...
over 80% of all pollination income for beekeepers in 2016 (Lee et al., 2017), so it has become a crucial source of income. At the same time, it is often the first stop on beekeepers’ pollination and honey production circuit after bringing their bees out of winter hibernation, so it is important to beekeepers that they reduce the number of agrochemicals their bees are exposed to, to protect them for honey production and future pollination contracts.

In March 2014, more than 70 commercial beekeepers met in Los Banos, California, with two representatives from the U.S. Environmental Protection Agency’s (EPA) pesticide labeling division to discuss the heavy colony losses they had experienced during almond pollination season that spring and the impact of the EPA’s proposed labeling changes. During that meeting, beekeepers expressed frustration with agrochemical regulation at federal, state, and county levels. One reason bees are exposed to bee-toxic agrochemicals during almond bloom is that the pesticide labels do not accurately represent an agrochemicals’ toxicity (Durant, 2020; Durant et al., 2021), and so farmers often apply agrochemicals during bloom that may have sublethal or synergistic toxicities for bees that are not reflected on the label. Beekeepers also complained about several other issues at the farmer’s level. One concern was that farmers sometimes leave open water out for bees to drink, which they appreciate, but if the water is not emptied and refilled after agrochemicals are sprayed, the water becomes contaminated by pesticides and can harm their bees. Another issue is tank mixing, where farmers combine multiple chemicals in the pesticide sprayer to reduce the number of times a pesticide applicator must pass through an orchard to spray agrochemicals. While this approach may save on labor costs for the farmer, it can lead to synergistic toxicities between the chemicals in the sprayer (U.S. Environmental Protection Agency [U.S. EPA], 2019). In other words, when combined, some agrochemicals that are not bee-toxic when applied alone (or were far less toxic) become sublethally or lethally bee-toxic when combined with other agrochemicals in a tank mix (Zhu et al., 2014; Fine et al., 2016; Wade et al., 2019).

Beekeepers requested this meeting with EPA in part because all pesticides applied in California are regulated by the U.S. EPA and the California EPA. Pesticides that have acutely or moderately toxic effects on bees are labeled bee-toxic (U.S. EPA, 2016); these are typically pesticides that cause a visibly toxic reaction within 24–96 h after application (e.g., mortality or behaving abnormally). Pesticides with sublethal or chronic toxicities for bees are typically not labeled as bee-toxic, so farmers tend to cut back almost entirely on their application of labeled bee-toxic pesticides during almond bloom, while still using a significant amount of sublethal bee-toxic pesticides during bloom that is not labeled as bee-toxic (Durant et al., 2021). These sublethal pesticides can have negative effects on adult and larval bees that may reduce a colony’s ability to pollinate during bloom or limit the development of larval bees (Thompson, 2003), which can affect honey production post almond bloom. However, because the label does not indicate bee toxicity at the synergistic or sublethal level, farmers are not required by state law to reach out to beekeepers before applying these pesticides.

Another reason bees are exposed to pesticides during almond bloom is because of shortfalls in the counties’ NOI system, which requires farmers to provide a 48-h notice to all beekeepers within a 1-mile radius before applying bee-labeled pesticides. However, because the county only requires notification for labeled bee-toxic pesticides, beekeepers are not usually notified about the application of sublethally toxic pesticides. Another problem with the NOI system is that some beekeepers do not register with the county, so they may not receive these notifications (Durant, 2020). A third problem is that while bees typically fly an average of a half mile from their colony to forage, they can fly up to 3.7 miles (possibly more) to obtain nectar and pollen (Hagler et al., 2011), so a 1-mile radius may not be sufficient. Finally, beekeepers sometimes have hundreds of colonies at a particular site, and assembling the labor to move can be very challenging for beekeepers to execute within 48 h.

The EPA representatives asked beekeepers why they could not complain directly to their farmer about their issues. Beekeepers expressed concern about being blacklisted if they complained to their farmer or reported pesticide label violations. In other words, the farmer might not want to work with them again and or might discourage other farmers from contracting with them. Another beekeeper stated that they only have one form of leverage with farmers, which is that if the farmer is going to spray a fungicide or insect growth regulator (IGR)—agrochemicals with documented toxicity to honey bees that are not labeled by EPA as bee toxic—then they will move the bees as a result. Stating that they will move the bees might disincentivize the farmer from doing the application since they would lose valuable bee pollination services while the bees are moved for several days. The logic, the beekeeper explained, is to disincentivize the farmers from spraying. In general, what became clear from the meeting was that many beekeepers did not feel that they could talk to their farmers (or their farmer’s pesticide applicator) about reducing their pesticide use, and so because of this they wanted to see changes in the labeling laws and regulatory practices to protect them instead.

That same month (March 2014), a multistakeholder meeting took place to address beekeepers’ concerns. California’s Department of Pesticide Regulation (CDPR) brought together leaders in the beekeeping industry and representatives of the Almond Board of California (ABC) and CDPR staff (CDPR, 2018a). The purpose of this meeting was to provide another forum for beekeepers to share their concerns about increased bee losses during almond pollination in the San Joaquin and Sacramento Valleys. Shortly after this forum, ABC formed a stakeholder group composed of leadership in the beekeeping and almond industries, as well as representatives from CDPR, University of California’s cooperative extension, U.S. EPA, Crop Life America (a pesticide group that includes Bayer and Syngenta), and Project Apis m., a honey bee focused nonprofit organization (CDPR, 2018a, p. 4).
One outcome of this group’s collaboration was a set of Bee BMPs for almond and beekeeping industry stakeholders. The stated aim for the Bee BMPs is to connect the varied parties involved in floral management through better communication between the different stakeholders during almond bloom. These stakeholders primarily include beekeepers and their bees, pesticide applicators, almond firms, and the CACs that regulate pesticide use in each county (Almond Board, 2019). Unlike BMPs that focus solely on how to manage a crop, the Bee BMPs emphasize communication between stakeholders. When beekeepers bring their bees into the state (or move them to a new location, if they are local), they are legally required to register the location of their colonies with the CAC office their colonies reside in and clearly mark them on site (Almond Board, 2019, p. 4). By registering online or through the county office, beekeepers can also choose to sign up for the county’s NOI program, where farmers must give beekeepers within a 1-mile radius of a labeled pesticide application notice of the intent to spray. In addition to following the legal requirements of the NOI system, almond farmers are encouraged to discuss pesticide practices with their beekeepers prior to bloom, communicate the details of their pesticide practices to beekeepers and other stakeholders throughout bloom (such as the pest control advisor and applicator), and contact beekeepers prior to application as well (Almond Board, 2019, p. 5). In addition, they are supposed to report any pesticide-related bee incidents to beekeepers and CACs (Almond Board, 2019).

Communication is the most essential component of Bee BMPs, and it is notable that they encourage almond farmers to act more protectively than state and federal regulations require. In addition to maintaining communication with all stakeholders, the industry recommends farmers only apply fungicides (which are often sublethally toxic) in the late afternoon or evening when bees and pollen are less present (Almond Board, 2019, p. 3). Second, they recommend against tank mixing agrochemicals due to the potential for synergistic toxicity. Third, they recommend farmers avoid applying any insecticides during bloom until more testing is conducted on larval and chronic toxicities for bees (see Table 1 for a list of all Bee BMPs).

On their website, beekeepers and their bees, and farmers and their trees are framed as “Pollination Partners” (Figure 3) that work together toward the common goal of pollinating almond trees and keeping bees healthy while in almond orchards by adopting the Bee BMPs (Almond Board of California, 2020a). The industry has

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**Table 1.** Honey bee best management practices (Bee BMPs) and their legal status. DOI: https://doi.org/10.1525/elementa.2020.00105.t1

| Recommended | Cover water sources for pollinator bees before pesticide applications (or replace water after) |
|-------------|------------------------------------------------------------------------------------------------|
| Recommended | Avoid applying pesticides during bloom with label cautions stating: “highly toxic to bees” or “toxic to bees” |
| Recommended | Avoid applying pesticides during bloom with label cautions stating “residual times” or “extended residual toxicity” |
| Recommended | Only apply fungicides in the late afternoon or evening, when bees are not present |
| Recommended | Avoided applying all insecticides (except B.t.) during bloom |
| Recommended | Avoided tank-mixing insecticides (except B.t.) with fungicides during bloom |
| Legally required | If labeled bee-toxic pesticides are applied, provide 48-h advance notice to all beekeepers within 1-mile radius |
| Legally required | Ensure that bee colonies are never sprayed directly with any pesticides |
| Legally required | Read the pesticides label’s protocols before applying any agrochemical for the first time |

B.t. = *Bacillus thuringiensis.*

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**Figure 3.** Image adapted from Almond Board of California (2016). DOI: https://doi.org/10.1525/elementa.2020.00105.f3
been disseminating these BMPs since their annual Almond Board Conference in 2014 and has continued at all subsequent Almond Board conferences, at numerous farmer meetings, and at pollinator-focused workshops. The Almond Board also conducts an ongoing self-assessment survey of farmers’ on-farm sustainability practices called the California Almond Sustainability Program and reported that 97% of the farmers who took the survey reported following all Honey Bee BMP recommendations during bloom (Almond Board, 2018). In the agricultural industry, the Bee BMPs are sometimes touted as the gold standard for protecting pollinators during bloom, and the BMPs have been adopted by the Australian almond industry as well (Almond Board of Australia, 2020).

Despite significant messaging, stated success, and the framing of "partnership," the actual adoption of these Bee BMPs is unclear. In interviews conducted from 2017 to 2018 (3 years after the initial dissemination of the Bee BMPs), beekeepers frequently complained about the use of fungicides and IGRs during almond bloom and resulting colony damage (Durant, 2019b). In 2018, one beekeeper shared a photo of a pesticide rig directly spraying his colonies in broad daylight during almond bloom (Figure 4)—which is illegal, although the beekeeper never reported the farmer out of a fear of losing the contract. In interviews, beekeepers describe the devastation of losing multiple colonies from a pesticide spray and having their almond farmer not apologize or repay them for their losses.

Beekeepers’ responses ranged when it came to feeling like they could communicate with their contracted farmer about their pesticide concerns (Durant, 2019a). Many felt very uncomfortable negotiating the terms of pesticide use on the orchard because they were concerned that the farmer would consider them "difficult" and not invite them back for pollination season. In fact, only approximately 30% of contracts between beekeepers and farmers included clauses about pesticide application in 2015 (Goodrich, 2017, p. 89), though updated research on this is needed. A smaller number of beekeepers expressed that they felt fine negotiating the terms of pesticide use on their orchards. In general, however, beekeepers felt a perceived asymmetry between themselves and farmers and were aware of their deep reliance on them for future pollination contracts. They felt that complaining about the farmer either directly or to the county would jeopardize not only their relationship with the farmer but their relationship with all other potential farmers if their farmer complained about them (Durant, 2020).

Farmers, on the other hand, had varying responses to their ability to adopt all the Almond Board’s BMPs. In interviews, almond farmers emphatically expressed that they do not want to kill their bees. Most farmers have spent approximately US$180–200 per colony, and at 2–2.5 colonies per acre, the cost per acre is substantial (Goodrich and Durant, 2020). However, some farmers expressed frustration with beekeepers, noting that beekeepers do not always register for the NOI system in the county (Durant, 2020), so when they use the NOI system, there is a risk that a nearby beekeeper might not be notified of a labeled bee-toxic spray and then the grower would be responsible for any damage to the colonies despite having followed the protocols. Even though the Almond Board encourages farmers to only apply fungicides in the late afternoon or evening, some farmers stated they would use a fungicide as needed and not contact the

Figure 4. A pesticide rig directly spraying bee colonies during almond bloom. Photo taken by beekeeper. DOI: https://doi.org/10.1525/elementa.2020.00105.f4
beekeeper because they are only required to contact a beekeeper if the label indicates bee-toxicity, and fungicides are not labeled bee-toxic. Farmers’ challenges are often logistic or economic: Mixing agrochemicals in a tank and doing one pass through an orchard is far cheaper than doing multiple passes, despite the risks. Additionally, applying fungicides in the evening can prove costly or dangerous from a labor standpoint, with risks involved in applicators walking the orchards or trying to fly an agrochemical applicator plane at night. As one might expect, farmers generally expressed that while protecting their bees is important, producing a healthy and viable crop is their number one priority. While they will follow the label and not apply insecticides during bloom, they may not always follow the BMPs if it conflicts with the needs of their orchard.

These qualitative findings are supported by quantitative research as well. An independent survey of approximately 350 almond farmers (representing 14% of total almond acreage) indicated moderate adoption of the Bee BMPs (Durant and Ponisio, 2021), counter to the high adoption rates cited by the Almond Industry. Specifically, only 60% of almond farmers stated that they “always” practiced all the legally required Bee BMPs (Table 1), while 29% practiced the six recommended Bee BMPs, which includes practices such as only applying fungicides in the evening when bees are not active, covering water when agrochemicals are being sprayed or dumping and then refilling the water afterward. These data are also supported by research on pesticide use in almond orchards. While farmers seem to be following the pesticide labels and not applying bee-toxic pesticides during bloom, their application of nonlabeled bee-toxic pesticides (those that the Bee BMPs discourage the application of during bloom, such as fungicides) are still quite high during the bloom period (Durant et al., 2021). Figure 5 highlights pesticide use in almond orchards during almond bloom from 2010 to 2016 and shows that while the application of labeled bee-toxic agrochemicals dips significantly during bloom, unlabeled bee-toxic pesticides spike significantly. Eighty percent of these unlabeled chemicals (Histogram B in Figure 5) were ones that the Bee BMPs encourage the
limited use of particularly fungicides (United States Department of Agriculture, 2013; CDPR, 2018b; Durant, 2020). The period of this study only ran until 2016, however, so future research would be needed to track the applications of bee-toxic pesticides and see whether there is a reduction in labeled and unlabeled bee-toxic agrochemical use during bloom.

In January 2020, the Board announced a “Five-Point Pollinator Protection Plan,” including a new partnership with Pollinator Partnership, “the world’s largest nonprofit dedicated exclusively to the protection and promotion of pollinators and their ecosystems,” to come up with a potential certification system for farmers who provide habitat for pollinators on their orchards (Almond Board of California, 2020b). Other components of the plan include funds to support bee health research and cover crops that provide floral diversity for honey bees during almond bloom. The “Plan” indicates that the almond industry is shifting toward taking greater responsibility for honey bees during almond bloom and encouraging their farmers to adopt a stewardship mindset toward bees by providing numerous types of support. However, by synthesizing beekeepers’ and farmers’ comments in interviews, Bee BMP adoption rate in 2019, and pesticide use practices during bloom as metrics of the success of collaborative forage management, blooming almond flowers are still managed in a way that can make them toxic to bees, within a context that can discourage beekeepers from feeling like equal partners in bee forage management during bloom.

**Discussion: The challenges of commoning bee forage in industrial agriculture**

The Almond Board’s BMPs illustrate an attempt to create commoning-like access arrangements to bee forage, a CPR. However, because these practices are largely disseminated and encouraged at the institutional level, they have not yet resulted in the kind of equitable sharing associated with genuine commoning, and thus offer an example of temporary floral pseudo-commons in an industrialized agricultural context. The arrangement aims to balance farmers’ needs for production and that beekeepers must constantly shift toward taking greater responsibility for honey pollinators and their ecosystems, “to come up with a potential certification system for farmers who provide habitat for pollinators on their orchards” (Almond Board of California, 2020b). Other components of the plan include funds to support bee health research and cover crops that provide floral diversity for honey bees during almond bloom. The “Plan” indicates that the almond industry is shifting toward taking greater responsibility for honey bees during almond bloom and encouraging their farmers to adopt a stewardship mindset toward bees by providing numerous types of support. However, by synthesizing beekeepers’ and farmers’ comments in interviews, Bee BMP adoption rate in 2019, and pesticide use practices during bloom as metrics of the success of collaborative forage management, blooming almond flowers are still managed in a way that can make them toxic to bees, within a context that can discourage beekeepers from feeling like equal partners in bee forage management during bloom.

Ribot and Peluso’s (2003) theory of access helps highlight the factors that limit equitable, collaborative, and horizontal commoning arrangements in industrial agriculture as well as the challenges of transitioning from usufruct rights and pseudo-commoning to a genuine commoning regime. They note that “the relation between actors who own capital and those who labor with others’ capital or means of production parallels the relation between actors who control others’ access and those who must maintain their own access” (p. 159). In other words, those who must seek and maintain access to resources are typically subordinate to those who control access. The fact that landowners control access to the land beekeepers need for production and that beekeepers must constantly seek access as migratory producers can place them in a subordinate power position, where they are only able to access land if they can refrain from making objections to pesticide practices.

**The limitations of the commons-fix: The exclusion of native bees from floral pseudo-commons**

A final important point about commons fixes is that, like other biological fixes that aim to overcome the barriers to capital production posed by nature, they tend to perpetuate the socioecological challenges that necessitated them in the first place. In this case, pseudo-commoning to maintain access to bee forage does little to solve the underlying reasons that farmers must hire
pollination services in the first place. Bee-reliant monoculture industries such as the almond industry require managed honeybee pollination for production in large part because agricultural intensification has reduced the abundance and diversity of native bees (Kremen, Williams, et al., 2002; Ellis et al., 2020), and thus there are not enough native bees to pollinate these crops at their current scale.

As mentioned earlier in the article, commoning is a constant process of boundary making, of inclusions and exclusions of members who can or cannot participate in the commoning process of a given resource or commitment (Nightingale, 2019, p. 22). This holds true for pseudo-commoning as well. The Bee BMP pseudo-commoning analyzed in this article reflects efforts to prioritize honeybee pollination services over that of native bees. As one almond farmer stated in an interview, “Almost no almond farmer is ever thinking about native bees in their day-to-day operations. It just isn’t practical” (November 15, 2019).

This is also reflected by a recent survey, in which most almond farmers (57%) expressed a moderate to low concern about the loss of native pollinators, and native pollinators were not a statistically significant factor incentivizing their adoption of bee-friendly practices (Durant and Ponisio, 2021). This lack of concern for native bees occurs despite the fact that native bees are efficient pollinators, even more efficient than honeybees for particular crops (Kremen, Williams, et al., 2002). Additionally, native bees could serve as an “insurance policy” against honeybee vulnerability (Kremen, Bugg, et al., 2002; Winfree et al., 2007) or relieve the need to have such large populations of honeybees shipped into the state.

As this dynamic calcifies—where U.S. farms become entirely reliant on honeybee pollination services as an external input—other possibilities for farming are effectively excluded. Instead of planting permanent forage to support native bee populations or transitioning to diversified or agroecological farming models, farmers can simply externalize their pollination services to beekeepers, reduce or limit pesticide use during bloom, and then return to business-as-usual once beekeepers are off their property. This means that the rest of the year, farmers are focused on their singular commodity, and little effort is made to provide habitat or reduce pesticides the rest of the year to support native pollinator populations.

This is one of the major challenges posed by commons that serve as a “fix” for industrial agriculture, which has emerged largely to protect an economically valuable species and ensure the continued production of commodities. Because native bees are not viewed as economically valuable and/or cannot be produced at scale to pollinate commodity crops the way honey bees can (though whether honey bees can actually be produced at this scale long term is questionable), they have effectively been excluded from some agricultural floral commons. Nightingale (2019) notes that even “commoning to promote more sustainable food production, can undermine habitats for less valued non-humans” (p. 25). Farmers reducing pesticides while flowers are blooming and protecting honey bee health is arguably more sustainable than using bee-toxic pesticides while bees are in almond orchards. Yet at the same time, cementing the almond industry’s complete reliance on managed honey bees facilitates the constant expansion of the almond industry across California’s Central Valley and continued fragility of the honey bee and forecloses opportunities to better integrate and support native pollinator populations.

Conclusion: Be(e)ing in common—toward a commoning of the bloom

In this article, I positioned bee forage (i.e., nectar and pollen) as a CPR managed through varied property regimes. Migratory beekeepers have long maintained access to forage on private property through informal usufructuary rights. However, as bee forage diminishes throughout the United States, their access becomes more tenuous and contested. Creating innovative approaches to managing forage so all bees (wild and managed) have more access could help mitigate bee losses, stymie bee forage conflicts, and help improve food security, given our food system’s reliance on bee pollination.

This discussion serves several purposes. One is to share an example of a bee forage access dispute in an industrial agriculture setting and attempts to resolve it through commoning-like practices. These practices, what I term pseudo-commoning protocols, may have resulted from collective action but are largely disseminated and encouraged by institutional actors with economic interests in the resource at stake rather than out of collaborative, context-sensitive relationships between the stakeholders themselves. Because of this, pseudo-commoning does not always translate into truly equitable resource distribution (though there are, of course, exceptions). Second, the Bee BMP case offers an example of a commons fix, where institutions promote pseudo-commoning to address a barrier to production. Here, the potential barrier to production is the loss of managed honey bee pollination services, so farmers have been incentivized to provide forage to protect their managed bees.

While the floral pseudo-commoning in this article may be a product of and for industrial agriculture, it does not have to be. The purpose of a commons—whether it supports capitalist production or aims to counter it—is not predetermined and can shift over time, depending on the values and intentions that are iteratively produced through the commoning process and who is included and excluded from commoning. As Gibson-Graham et al. (2016) state, “Commoning is a messy and fragmented process in which transformation takes place with different rhythms over a long timeframe” (p. 208). Bee BMP adoption could potentially lead farmers and beekeepers to a more equitable and ecological floral resource management approach. Moving away from top-down prescribed BMP practices and toward bottom-up relational practices (such as commoning) could support genuine transitions to sustainable agriculture in turn (Jordan and Constance, 2008).

As this article has demonstrated, the power asymmetry between beekeepers as migratory contractors who are seeking forage access and landowners who are in control...
of forage access may limit horizontal and equitable social relations. This subordination challenges beekeepers’ ability to be equal members in a genuine commoning arrangement, to be fully protected by existing regulations (because they are afraid to report farmers), or to have the horizontal and equitable social relations that commoning seeks to establish. It does not mean that this situation is intractable and that beekeepers cannot ever achieve genuine commoning with industrial farmers. However, this power asymmetry would likely need to be accounted for, and these efforts emerge from a place of care and collaboration between farmers and beekeepers in ways that take farmers’ and beekeepers’ contexts into account.

Adopting a genuine commons approach to bee forage could not only support managed honey bees but would ideally support native bees as well. If agricultural industries want to solve their constant need for a honeybee “pollinator fix” and work toward more sustainable and resilient models of production, wild bee ecologists and advocates would also likely need to be included in the commoning community. With this paradigm shift, landowners and managers in urban and rural contexts might take a different approach toward land management that is more protective of the bee forage on their properties year-round, instead of just while their crop is blooming, an awareness that would benefit both wild and managed bees and extend the responsibility for pollinator stewardship to everyone with blooming flowers on their land.

Data accessibility statement
The data in this publication came primarily from interviews and have been kept private to protect the identities of the respondents. Please contact the author with any questions regarding the data informing this article.

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