



Collective Rural Women Access, Use, and Control Over Communal Land in Mexico: A Post-capitalist Feminist Political Ecology Approach

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Rural women's access to land is fundamental for their individual and household well-being, equity, and empowerment. In Mexico, the agrarian reform of 1992 and customary gendered rights shaped land use, access, and control. Rural women's access to collective land is relevant since social property—*ejido* and *agrarian communities*—represents 52% of the national territory. As an expression of the collective organization, commons were also performed to use and control communal land and biophysical resources collectively. This paper examines the collective peasant women's bargaining process to access, use, and control communal land. The post-capitalist feminist political ecology approach allowed us to distinguish and analyze gendered strategies employed by a cooperative led by women at different levels—household, community, and government—to access and use communal land and biophysical resources by the process of commons—commoning. Rural women's collective efforts are located in Hidalgo, central Mexico. Firstly, the Agrarian Reform modifications related to gender equality issues are investigated, followed by examining rural women's socioeconomic conditions. The case study permitted us to identify and analyze critical factors that enhanced long-term agreements to control communal land beyond the Agrarian Law scope by the commoning examination. The collective rural women's strategies to use communal land improved well-being based on gendered peasant knowledge, organization, and stakeholder support. Nevertheless, the strategies increased women's burden and reinforced the existing gendered norms such as female altruism. Furthermore, the need to discuss the bargaining process over communal land concerning a diversity of commons is argued: knowledge, social, and biophysical, in which gender and care are critical variables.

Keywords: communal land, gender, cooperatives, post-capitalist feminist political ecology, bargaining, commons, Mexico, feminist ethics of care

INTRODUCTION

The agrarian change bolstered by neoliberal agendas opened the land to market through private and individual land tenure as a vehicle to counteract rural poverty and increase the small farming productivity since 1990 (Deere and León, 2001a; Bruce et al., 2006; Razavi, 2007; Byerlee et al., 2009). The reform involved opening up the customary system to privatize collective land (Razavi, 2003; Federici, 2011; Caffentzis and Federici, 2014). Although some Latin American agrarian reforms addressed gender issues in this shift, the unequal women's access to land persists (Deere and León, 2001a, 2004). The neoliberal trend assumed that rural women could buy land, enhance their intra-household bargaining power, and overcome traditional inheritance land systems individually. Land liberalization ignored gender interests over biophysical resources (Deere and León, 2001b; Deere and Leon, 2003). The neoliberal shift failed to capture gender inequalities to access land and use natural resources in statutory and customary systems by focusing on rural household productivity and disregarding situated gender dynamics to use collective land that was fundamental to the well-being of households (Razavi, 2007).

After two decades of land privatization, intensive agriculture, and food price instability, the livelihood local provision gained attention as an alternative to mitigate the consequences of food crisis (de Janvry and Sadoulet, 2011), address food precariousness caused by the deterioration of economic conditions (Federici, 2011), and move toward livelihood sovereignty (Tilzey, 2018, 2021). Additionally, rural households have diversified by incorporating non-agriculture activities to face poverty (Razavi, 2007). Women's access to land is a critical variable to meet households' subsistence needs (Federici, 2011); however, rural women face gender inequalities, including extensive time burdens, limited decision-making authority, and lack of control over financial and biological resources (Quisumbing et al., 2011; Meinzen-Dick et al., 2019). Scholars have addressed individual women's access to land in current debates surrounding rural development, environmental sustainability, household livelihood, and women's economic empowerment (Agarwal, 1994; Deere and León, 2001a; Razavi, 2003; Farhall and Rickards, 2021). Nevertheless, women's collective efforts to use communal land beyond the assets and productivity perspective are rarely explored (Deere and Leon, 2003; Radel, 2012).

The post-capitalist feminist political ecology (Post FPE) approach explores how the interdependence between the biophysical, social, and knowledge commons is fundamental for women's collective access to land and contributes to a sustainable livelihood. This paper investigates how women collectively bargain the access, use, and control over communal land to meet household and community care needs by analyzing one peasant cooperative led by women with more than two decades of producing natural medicine in Hidalgo, central Mexico. Drawing on the Post FPE, we analyzed the gender dynamics enacted by women cooperative members that shape their access and control over land and biophysical resources. In addition, by multilayer relations, we examined the commons interdependence in the household, cooperative, community, and national levels,

beyond the productivity lens (Gibson-Graham et al., 2016). The Post FPE sheds light into the social dynamics in socio-nature relations beyond property rights and distinguishes multispecies communities engaging in reappropriation, reconstructions, and these commons' reinventions (Harcourt and Escobar, 2005).

The rural Mexican case is addressed because social property and commons are in force, even though the agrarian reform of 1992 allowed its privatization (Morett-Sánchez and Cosío-Ruiz, 2017). Mexican rural women's collective efforts to use communal land are related to the interdependence of the biophysical and non-biophysical commons (Movimientos Sociales y Cultura Rural, 2019; Soto-Alarcón et al., 2020). This paper begins with the Post FPE theoretical framework. After describing the research site, methods, and data collection analysis, we address the collective women's negotiation to access and use communal land and biophysical resources in order to provide sustainable livelihood by the interdependence between the biophysical, knowledge, and social commons. Finally, we discuss the tensions faced by cooperative members in the bargaining process.

THEORETICAL FRAMEWORK

Post-capitalist Feminist Political Ecology

The Post FPE combines insights of the feminist political ecology (FPE) and the community economies perspective of commons (Clement et al., 2019; Sato and Soto-Alarcón, 2019). This approach helps to analyze the collective negotiation of members of the women's cooperative to use communal land and biophysical resources by identifying the gender dynamics and the interdependence of the commons in the sustainable provision of livelihood. With the FPE lens, gender interacts with class, caste, race, culture, and ethnicity to shape access and control natural resources (Rocheleau et al., 1996). FPE emphasizes the multilayer analysis of the power dynamics within households, communities, and at the national level related to the politics of conservation and environmental degradation, particularly in the neoliberal trend of nature commodification, capital accumulation process, dispossession, and climate change (Leach, 2007; Elmhirst, 2015; Clement et al., 2019). FPE examines the gender dynamics involved in the differentiated impacts of ecological issues and the strategies to deal with them, including women's empowerment (Elmhirst, 2018). Hence, FPE highlights women's voices, knowledge, and experience on ecological struggles. This perspective moves away from the essentialist image of women as victims of environmental issues; it acknowledges that women experience environmental changes differently, not because they are women *per se* but because of the structural inequalities they face (Harcourt and Nelson, 2015).

Gender subjectivity is another functional strand of FPE by examining the intersection of gendered collective women's efforts, ethnicity, class, and public policies. This subjectivity is mutually constituted by race, ethnicity, class, the politics of access to natural resources, and conservation in multilayer dimensions (Sundberg, 2004; Nightingale, 2011; Mollett and Faria, 2013; Clement et al., 2019). Based on post-structuralist feminism, gender is co-produced over time (Butler, 1988),

space, and embodied practices related to caste, class, and age (Nightingale, 2006, 2011). Relational subjectivities emerged from situated power dynamics and environmental struggles (Nightingale, 2006). FPE takes advantage of post-humanist ontologies by discussing human and non-human material and bodily connections to face ecological troubles. For instance, medicinal plants (non-humans) accompany humans to solve or deal with community and environmental health problems. By relating plants and humans, they become partners able to cope with problems (Haraway, 2016; Nightingale, 2019). The gendering access to natural resources is mutually delimited by everyday practices to produce sustainable livelihood (Elmhirst, 2011; Radel, 2012).

Another component of this Post FPE discusses commons beyond natural resources as a capital accumulation basis and distinguishes commons' role to meet subsistence needs (Federici, 2011; Jarosz, 2011; Elmhirst, 2018). Instead of focusing exclusively on commons as a form of property, Post FPE examines the collective action to bolster the production, exchange, and new ways of being in common (Nightingale, 2019). In the Post FPE analysis, communities take care of the commons by defining rules, organizing labor, and sharing profits and responsibilities; the process is crucial in the reappropriation, reconstruction, and the reinvention of commons (Harcourt and Escobar, 2005; De Angelis, 2014). Commons is a process—commoning—applicable to private, state-owned, or open-access properties (Gibson-Graham et al., 2016). In commoning, access to property must be shared; a community must negotiate its use. Its benefit must be distributed to the community and possibly beyond, and the responsibility to *care for* the property—biophysical and non-biophysical resources—must be assumed by the community members (Gibson-Graham et al., 2013). Commoning “expresses relationships in a society that are inseparable from relations to nature,” which involves juridical and day-to-day material reality (Linebaugh, 2008, p. 279). Introducing the legal dimension of commoning allows distinguishing how the law supports, restricts, or excludes someone from commoning forms (Nightingale, 2019). This approach does not privilege the legal domain, but it is one critical element in the co-production of commons. Furthermore, commoning implies a relational process of negotiating the access, use, benefit, care, and responsibility considering others' well-being (Gibson-Graham et al., 2016). Commons are not given but are co-produced (Caffentzis and Federici, 2014) by multispecies communities (Gibson-Graham et al., 2016). The Post FPE approach of commoning discusses the multiple-scale interdependence between the biophysical, social, cultural, and knowledge commons (Sato and Soto-Alarcón, 2019) in the recreation of commons.

The feminist ethics of care is another critical dimension in this Post FPE by recognizing the efforts of multispecies communities to sustain human and non-human life (Haraway, 2016). In order to investigate how women enacted ethical practices of caring, the feminist ethics of care is addressed by identifying sustainable practices in the natural resources used partly governed by social, moral, and reciprocity relations to provide well-being (Walsh, 2015; Haraway, 2016; Castagnetti

et al., 2021). Distinguishing these ethical practices of care is crucial toward transformative politics (Wichterich, 2015). Care is considered a process of four phases. Firstly, it involves the attentiveness to perceive needs and decisions over which need to *care about*. Secondly, once needs are identified, someone or some group assumes the responsibility to meet caring needs—*caring for*. Thirdly, performing care labor requires the moral quality of competence, not only technical ones—*caregiving*. Finally, *care receiving* involves the response from a person or the environment cared for (Tronto, 2011). The feminist ethics of care enables us to understand the collectivization of social reproduction as women's strategy to deal with poverty and violence and create collective interest and mutual bonds (Caffentzis and Federici, 2014; Vaz-Jones, 2018). The understanding of the feminist ethics of care allows us to move toward affirmative politics. These policies cultivate relations that augment our capacity to act in a world constructively, generating alternatives (Braidotti, 2009).

Collective Women Access in the Mexican Agrarian Law

The Mexican Agrarian Law reflects the historic struggle between private and collective forms of landholdings recognized by Article 27 of the National Magna Carta (Arizpe and Botey, 2014). Agrarian reform involved the most significant redistribution of collective land—*ejidos*—and Indian community systems—*agrarian communities*: both constituted the social property defined by the agrarian nucleus (Warman-Gryj, 1996). The law has been constantly modified. The Federal Agrarian Reform Law (FARL) of 1971 considered *ejidos* as conduits of economic and social policies by structuring them as organisms for production, commercialization, credit, industrialization, and social life with juridical status (Almeida, 2012b). The FARL of 1971 explicitly established legal equity between women and men with ownership rights over the collective land as *ejidatarios*. This law particularly encouraged the collective organization of rural women by creating the Women Agro-Industrial Units (WAIU) in the *ejidos*. *Ejidatarios* must provide collective land for women's projects organized collectively. All women older than 16 years could hold a plot of land for special agricultural or agro-industrial projects within the agrarian nuclei (Almeida, 2012b; Arizpe and Botey, 2014).

The constitutional reform of 1992—encouraged by the North American Free Trade Agreement (NAFTA)—concluded the national collective land distribution and promoted its privatization by allowing leasing, sharecropping, selling, and land lending (Almeida, 2012b; Gómez de Silva-Cano, 2016). The 1992 amendment defined the procedure to certify *ejido* titles by the Certification Program for *Ejido* Rights and Land Titling, securing property rights (de Janvry et al., 2015). However, by prioritizing market strategies to obtain land, women could not buy it, worsening their situation by losing their place as heirs to the collective land (Almeida, 2012b). The Agrarian Law amendment of 2018 recognizes men and women as *ejidatarios* with rights-holders and encourages women's group participation in *ejidos* and community collective enterprises to use natural resources (Agrarian Law, 2018). Previous amendments do not

modify the privatization of social property. Despite the neoliberal reform bolstering social property privatization, the number of *ejidos* registered in the National Agrarian Register grew (0.12%) between 2010 and 2017 (RAN, 2020a). In addition to the social property specified by the Agrarian Law, commons as an expression of the collective organization are performed in rural Mexico to preserve the territory (Movimientos Sociales y Cultura Rural, 2019). Nevertheless, private and collective lands tend to concentrate, bolstered by public policies through subsidies that benefit the most privileged producers, allowing collective land privatization or granting mining concessions. At the same time, leasing land through agreements between producers and the agro-industry and the monopolist control of agricultural production are examples of the market's ability to concentrate land in rural Mexico (Robles, 2012).

Scholars have highlighted that the Mexican neoliberal reform has adverse gender effects. This reform abolishes the *ejido* patrimonial character, neglects the wife's rights to obtain land as an heir or successor, individualizes land titling without considering the family, and finally opens the collective land market (Almeida, 2012b). Additionally, women's access to land is constraint by the patriarchal notions of masculinity and femininity by assuming that males are exclusively the producers and heads of households (Deere and León, 2004; Almeida, 2012a). Nevertheless, women's participation in the social property increased between 2016 and 2020; the number of *ejidatarías* (registered) grew 7.55%, *comuneras* (to be a member of *agrarian communities*) 6.25%, and *avecindadas* (they have property rights over the plot exclusively) 14.48% (Table 1). Women compose 25% of the *ejidatarios*, 30% of *comuneros*, and 33% of *avecindados*. According to the National Agrarian Register, 62.03% of the women with certified agrarian nucleus are *ejidatarías*, 19.21% *comuneras*, 14.91% *posesionarias* (they have property rights over parceled land), and 3.85% *avecindadas* in 2020 (RAN, 2020b). The out-migration of women and men and the feminization of the countryside were variables that modify women's access to land properties (Almeida, 2012b).

Article 71 modification of the Agrarian Law in 2017 suggested assigning the best quality land nearest to the urbanized area for the establishment of WAIU, thus bolstering women's access to collective land and their productivity. However, women's collective efforts to access and use collective land led by the Agrarian Law through WAIU face structural constraints such as unequal access to markets and insufficient training, making their efforts unsustainable (De Barbieri, 1982; Mingo, 1996; Almeida, 2012b). The registration statistics of WAIU reveal their limited growth (8,624 were registered in 2018, 8,629 in 2019, and 8,630 in 2020) (RAN, 2018, 2019, 2020c). The cultural inheritance patterns also make individual access to *ejido* land difficult by considering women as the land's temporary guardians and neglecting their interest over the land and biophysical resources (Vázquez García, 2001). In addition to their exclusion in *ejido* decision-making positions (Vazquez-Garcia, 2008; Almeida, 2012a), albeit the Agrarian Law establishes that at least 40% of the candidates for positions in *ejido* or *agrarian communities* must be women, only 7.4% of *ejidos* and *communities* were chaired by women in 2019 (IMCO, 2020). Nevertheless, there is a slight

TABLE 1 | Women with certified and non-certified agrarian nuclei.

Period	No. of women with at least one existing parcel or common-use certificate, by type, and total percentage				No. of women recognized as <i>ejidataría</i> or <i>comunera</i> , without a certificate			
	<i>Ejidatarías</i>	<i>Comuneras</i>	<i>Posesionarias</i>	Total (%)	<i>Ejidatarías</i>	<i>Comuneras</i>	Total (%)	Total (%)
2016	615,101	199,952	198,472	19.02	37,600	43,280	46.49	53.51
2017	720,283	237,833	198,910	16.66	44,696	49,123	47.64	52.36
2018	725,403	244,738	197,979	16.35	44,570	49,362	47.45	52.55
2019	818,965	252,071	197,804	15.01	44,831	48,655	47.95	52.05
2020	822,988	254,818	197,849	14.91	44,905	49,122	47.76	52.24
Average growth rate	7.55	6.25	-0.08	14.48	4.54	3.22		

Source: Registro Agrario Nacional (RAN, 2020a,b).

growth compared to that in 2018, with 6.95% (Laguna and Del Ponte Flores, 2019).

Women face structural inequities in accessing resources individually too. Between 2014 and 2019, women producers have grown from 15.10 to 16.98% of the total producers. However, agricultural equipment ownership is distributed between men (87%) and women (13%). Men (79%) and women (21%) possess the documented land ownership. Related to other properties, men possessed 62% and women 38% (INEGI, 2016). These data reinforced the gender gap in assets. Women's access to credit is also limited; only 9.2% of the production units headed by women received credit (CEDRSSA, 2016). While women's productive owners are in the age groups of 61–75, 76–85, and over 85 years, women producers aged under 18 years had significantly decreased (Table 2). Within the agricultural workforce, the percentage of women decreased (from 17.26 to 16.74%); there has been a slight increase in unpaid labor (from 30.11 to 30.35%) and a decrease in the percentage of paid work (from 12.96 to 12.45%). In addition, women's permanent and temporary work decreased during the previously mentioned period (ENA, 2014, 2019).

In order to face precariousness such as the lack of health services and the insufficient food provision caused by structural inequalities, rural Mexican women deployed strategies to use natural resources and contribute to the provision of a sustainable livelihood. Ethnicity, peasant knowledge, and economic status intersect women's efforts to access and manage natural resources. Scholars have documented women's interest and management over biophysical resources, including land. Rural women were the main gatherers of wild edible plants (*quelites*) among the Nahuas and Popolucas in Veracruz (Vázquez-García, 2008). Otomi women grow maize to make tortillas in central Mexico (Rimarachín et al., 2001). Gendered strategies were performed in the *poleo* gathering practices for medicinal and cultural purposes in Oaxaca (Vázquez-García and Ortega-Ortega, 2016), and even in the renewable energy transition in Zacatecas, women's efforts are crucial for the provision of household livelihood (Buechler et al., 2020). The above studies reveal how rural women's efforts are diverse and contribute to household and biodiversity well-being within the scope of agrarian reform and beyond, for instance, in private property and communal land, governed by civil code and customary rights. This research aligns with the studies previously mentioned by analyzing collective women's efforts to access biophysical resources employing a case study approach. In this case study, the Agrarian Law does not shape women's access to communal land because there are not agrarian nuclei in the research community. Instead, rural women enacted gendered strategies to negotiate collective access to communal land.

METHODOLOGY

Field Site Description

Unión de Mujeres San José de las Manzanas (Manzanas, hereafter) is a cooperative integrated by 10 mestizo (non-indigenous) peasant women settled in Las Manzanas Tlahuiltepa Hidalgo, central Mexico (Figure 1). The Manzanas cooperative

produces natural medicine—syrups, ointments, soap, and tinctures—based on the sustainable use of medicinal plants. The cooperative members are between 50 and 70 years old. On average, they have five to seven sons and daughters. Las Manzanas, Tlahuiltepa, is a peasant community with <2,000 inhabitants, primarily mestizos. The community has a temperate climate. It is located between the mountains of the eastern Sierra Madre. Oak, cedars, and precious woods are part of the forest. Only three *ejidos*—Chicacasetla, San Andrés Miraflores, and Santiago—and two *agrarian communities*—Iztamichapa and Santiago—represent the social property of the Tlahuiltepa municipality (RAN, 2020a). Agrarian Law governs access to collective and communal lands in these communities. However, in the Las Manzanas community, the plots are private properties governed by civil legislation and customary norms for access and use of communal land. By not having *ejidos* or *agrarian communities*, the Agrarian Law scope does not reach this community. Peasants' plots have approximately 5 ha; the owner is the head of household, mainly men. Inhabitants are primarily engaged in planting and harvesting oregano. As a commercial crop, peasants sow oregano exclusively on their family plots (private land). The rise in oregano price boosted forest clearing. Some peasants do *milpa*—intercropped maize, beans, and squash system. Additionally, male out-migration is a widely practiced household survival strategy.

The women's collective efforts came from 1997 when some peasant women from several Tlahuiltepa communities wanted to use local natural resources and improve the health of their household members by producing natural medicine based on medicinal plant knowledge (Gil and Sánchez, 2013). Access to health services for the Las Manzanas community is limited because the nearest hospitals are 3 h away on a rural road and public transport offers only one daily departure. Albeit the communal "health house" supported by the state provides health services, medical attention is infrequent. A nurse attends once a month. Therefore, public services often do not provide thorough *care for* daily ailments, emergencies, or expensive medical treatments. As a result, most peasant families buy expensive private health services. In this context, women's collective efforts wanted to deal with community health issues.

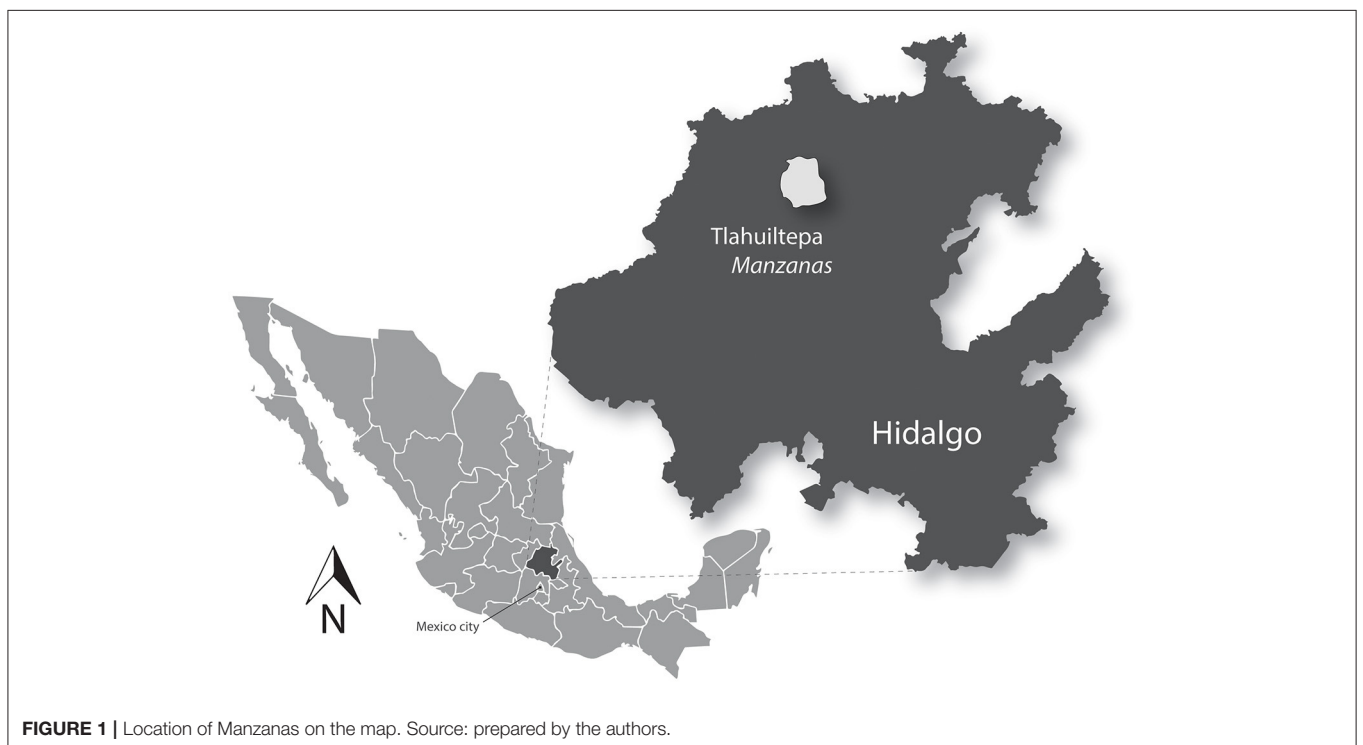
Methods

This research examines the collective strategies of Manzanas members to access, use, and control communal resources distinguishing multilayer analysis. The case study approach enables identifying patterns and developing a sense of the whole phenomenon (Levitt et al., 2018) by recognizing how the gendered access and use of communal property were interdependent of the interaction of the commons. The interdependence between commons—biophysical, knowledge, and social—made the access to communal land and biophysical resources possible for rural women collectively. The case study's qualitative research involved three steps: data collection, data coding, and data analysis. The first author did the data collection. Fieldwork was carried out at irregular intervals between 2012 and 2019. During this period, the researcher supported the cooperative in organizational and commercial

TABLE 2 | Rural women farmers' socioeconomic status.

Category	% of the producers (es)		Category	% of the agricultural workforce	
	2014	2019		2014	2019
Women producers	15.10	16.98	Women in the total labor force	17.26	16.74
Speak an indigenous language	14.10	16.99	Unpaid labor	30.11	30.35
Does not speak an indigenous language	15.40	16.97	Paid labor	12.96	12.45
No study	21.36	24.72	Permanent workforce	15.47	10.09
Pre-school		20.63	Temporary labor	12.68	7.23
Elementary school	13.98	15.61	Daily work	11.83	13.27
Middle school	12.34	16.88	Participating women producers	11.31	14.34
High school	10.07	13.70			
Technical career	28.28	10.54			
Bachelor's degree	12.63	12.52			
Postgraduate	9.35	17.62			
Other studies	42.93	34.76			
Not specified/not known	25.34	6.38			
Under 18 years of age	40.70	0.57			
18–25 years	16.90	12.35			
26–45 years	12.00	14.08			
46–60 years	14.50	15.22			
61–75 years	17.00	18.74			
76–85 years	17.10	20.43			
Over 85 years of age	17.50	25.35			

Source: INEGI. Encuesta Nacional Agropecuaria (ENA, 2014, 2019).



processes. Promoting sales outside the community bolstered the relationship with the cooperative. At the same time, attendance in religious and communitarian celebrations and

daily prayer meetings were relevant for the community members. These collaborations reduced the initial lack of confidence toward the researcher and strengthened their relations with

the cooperative and community members. It is important to mention that men mainly observed the participation of women in these events.

Environment reports (ERs) were made to know medicinal plant reproduction, scarcity, use, and gathering places, followed by participant observation (PO) over environmental practices and organizational strategies performed by women cooperative members to access, use, and control communal land. PO was employed within the households and community. Four families hosted the researcher; this stay made observing the gender power dynamics among family members possible. We observed the relation with husbands because they perform peasant activities related to the cooperative. At the communitarian level, PO was deployed during the communitarian meetings and the trips to the community by using public transport since it is a space for socialization. In focus group discussions (FGs), all the cooperative members explained the bargaining to access and use communal land. FGs were performed every 4 months in 2014–2016. Between 2018 and 2019, the FGs were every 6 months (FGs = 16). However, one critical issue discussed collectively was the tensions faced by the members to preserve the cooperative. This topic involved conflicts with neighbors who sometimes are their relatives. The problem was addressed by employing PO within households. In addition, the gender power dynamics are examined within community levels using communal authorities' interviews (CAI). Two different authorities were interviewed (both were men); cooperative members made sure to explain the purpose of the interview previously. Identities of the cooperative members and the other actors were modified to preserve anonymity. Data were recorded in field notes. The Code of Ethics of the International Society of Ethnobiology guided the research.

Data Analysis

Using the data analytic strategies (classification and analysis) of Levitt et al. (2018), the concepts addressed by the Post FPE perspective guided the data classification. We analyzed the gendered access and use of natural resources and how subjectivities emerged from these relationships following the insights of Nightingale (2006, 2011) and Elmhirst (2011). The process of negotiation to access, use, and control over natural resources was examined according to the concepts developed by Rocheleau et al. (1996), Clement et al. (2019), and Elmhirst (2018). The caring practices performed by the cooperative members were analyzed under the scope of the feminist ethics of care notions generated by Tronto (2011) and Braidotti (2009). Examination of the commoning process was guided by the conceptions of Caffentzis and Federici (2014) and Vaz-Jones (2018) by distinguishing the commons' role to provide a sustainable livelihood for rural households. The insights of Gibson-Graham et al. (2013) and Sato and Soto-Alarcón (2019) conducted the examination of the commons' interdependence. Researchers discussed the topics. The examination of the topics implied the quote selection. Its coding was conducted with the four main topics mentioned above. It was contrasted to capture gender differences in the accessibility of natural resources and the power dynamics involved.

RESULTS: MANZANAS ENACTING COMMONS TO ACCESS AND USE COMMUNAL LAND

Manzanas has produced for more than two decades natural medicine to assist in community health issues. The collective production of natural medicine led women to negotiate their access to communal land, although the Las Manzanas community is not within the scope of the Agrarian Law by not having *ejidos* and *agrarian communities* (see section Collective Women Access in the Mexican Agrarian Law). Only two cooperative members have the land property (private); these women inherited the land from their father and husband. The rest of the members do not have land, but they collaborate in the family plots owned by their husbands. The women's collective demand for communal land involved bargaining with male relatives and communal authorities. However, family members and communal authorities did not necessarily distinguish women's needs for land and resources; their support was hard-won. This section presents the cooperative members' struggle to access local resources—medicinal plant and communal land—based on the interdependence of the biophysical, knowledge, and social commons (Table 3).

Biophysical Commons

The Manzanas collective organization is interdependent on women's access to biophysical resources and the sustainable use of medicinal plants. Women learned from their grandmothers the flowering times of plants, their scarcity, and how to preserve them. The medicinal plant management involved gender dynamics since their uses are related to caring practices assumed by women as a gendered responsibility. One cooperative member explained:

Grandmothers taught us how to care for medicinal plants. The plants grow in the mountains, and some of them are planted in our backyard. We do not use the roots. If we do not have plants, we cannot prepare medicine and take care of our family (FGs, 2015).

Women identify their relations with medicinal plants and their contribution to carrying out women's responsibilities of caring. Thus, medicinal plant preservation intersected with women's interest in attending to health issues. The experiences of cooperative members in maintaining local plants recognized the environmental needs of reforestation by diversifying the supply of plants that are not being coerced by ownership regimes. Another woman said:

We use plants from everywhere; wild plants are grown in the forest. If we need, for example, *hierba de la Cruz* [*Gallium mollugo*] or *salvia del cerro* [*Salvia officinalis*], we walk hours in the forest. Some plants are easy to find; others are not. However, with climate change, wild plants are increasingly scarce. Some

TABLE 3 | Forms of commons performed by Manzanas.

Dimension	Access	Use	Benefit	Care	Responsibility	Ownership
Biophysical	Shared by cooperative members and medicinal species of plants	Negotiated by the cooperative with the community	Distributed between cooperative members, families, and community, the future generation, non-human species	Performed by cooperative members, supported by the community, NGO, and municipal authorities	Assumed by cooperative members	Privately, communitarian, and collectively owned
Knowledge	Cooperative members, NGOs, and universities	Cooperative members supported by external actors	Cooperative, households, community, non-human species, widely distributed to local communities	Cooperative members, University	Cooperative members	Collectively (e.g., cooperative) Privately (e.g., the knowledge taught grandmothers to daughters)
Social	A. Health practices shared by cooperative members B. Other cooperative forms of production—oregano. C. Community water supply system	A. Cooperative members supported by an external actor B. Cooperative members C. The water supply system organized by the community	A. Cooperative members, family members, consumers, and non-human species are widely distributed to a community. B. Cooperative members and their family members C. Community members	A. Shared by cooperative members B. Oregano cooperative members C. Community members	A and B: Cooperatives C. Committee supervises water use.	A and B: Collectively owned (alternative private), households C. Community-managed

Adapted from Gibson-Graham et al. (2013). Source: (FGs, 2014–2019).

plants are grown in our backyards, for example, *toronjil* [*Melissa officinalis*] or *pericon* [*Tagetes lucida*] (FGs, 2016).

The collective production of natural medicine is a shared responsibility to gather, select, and preserve medicinal plants in the mountains and reproduce them in the household backyards. Members assume the responsibility to *care for* the plants by reforestation practices in their backyards. Women observe the relationship of plants with the moon phases for better reforestation practices; the member with the most peasant knowledge teaches this practice. The members schedule the plant cutting, contemplating the rainy and dry seasons and the increasing scarcity in the forest where they gather. In a focus group, members explained: “In the dry season, we do not harvest because the plants could die. Wild plants need time to recover” (FGs, 2016).

Additionally, the members distribute the plant provision; other cooperative members explained: “Each member provides a small number of plants; we usually know the plants’ location nearest our home” (FGs, 2015). Manzanas organized labor for sharing responsibilities in the medicinal plant provision. This sustainable practice did not want to overuse some areas. The cooperative members performed environmental preservation practices by reproducing medicinal plants in their backyards since most members have seedbeds. Hence, biophysical commons are not given but are recreated by the interdependence of the Manzanas collective organization and peasant knowledge.

Medicinal plant preservation is not guided by community health needs exclusively. Plant reproduction is an enjoyable

activity for cooperative members too. Women’s preservation practices are partly governed by social and moral relations to provide well-being by improving food taste and beautifying their houses; one of the members said:

I have seedlings of lemon balm, basil, coriander, flowers, and fruit trees. I like plants; they give flavor to food, help with health issues, and are pretty. Since I was a girl, I learned from them, and I cannot imagine a house without plants (FGs, 2016).

The collective preservation of medicinal plants was also encouraged by a national policy within the gender and sustainability program scope. It subsidized a greenhouse in 2008 to reproduce medicinal plants (FGs and PO, 2014). The program remained less than a year. Cooperative members removed the reforested plants to their backyards for better supervision. Natural medicine production in the cooperative requires the diversification of the provision of medicinal plants: 54% are wild plants, 36% grew in backyards, and 10% were bought in the markets (Table 4) (ERs, 2018).

Within the cooperative members’ households, natural medicine production did not compromise the natural resources used by men who have focused on oregano production. One of the members explained: “our husband and sons sow oregano in our family plots; we use a little in the making of soap since oregano helps to cleanse the face. They sow oregano and we process it” (FGs, 2016). The Manzanas cooperative uses a small amount of oregano to make soap, tincture, and syrup. Although two cooperative members have individual properties, they do not use them for natural medicine production since the lands are far

TABLE 4 | Some medicinal plants used by Manzanas.

Products	Some plants used		Habitat ^a	Location ^{a,b}	Specification ^b
	Colloquial name ^a	Scientific name ^b			
Dry cough (syrup)	<i>Tejocote</i>	<i>Crataegus mexicana</i>	Temperate climate	Forest ^c	Native in Mexico and Guatemala
	<i>Encino Blanco</i>	<i>Quercus</i> sp.	Temperate climate	Forest/wild	
	<i>Flor de Sauco</i>	<i>Sambucus mexicana</i>	Warm, semi-warm, and temperate climate	Wild and backyards	
Coughing up phlegm (syrup)	<i>Tepozán</i>	<i>Buddleia cordata</i> HBK.	Warm, semi-warm, and temperate climate	Wild	Native in Mexico
	<i>Salvia de casa</i>	<i>Salvia leucantha</i> Cav.	Warm, semi-warm, and temperate climate	Backyard	
	<i>Poleo blanco</i>	<i>Polimntha marifolia</i> (Schaver) Gray	Warm, semi-warm, and temperate climate	Wild	
	<i>Salvia grande</i>	<i>Salvia</i> sp.	Warm climate	Wild	
Calm (syrup)	<i>Hierba de la cruz</i> (second name)	<i>Eupatorium pycnocephalum</i> Less.	Warm, semi-warm, and temperate climate	Wild	Native in Mexico
	<i>Salvia Chiquita</i>	<i>Buddleja perfoliata</i> Kunth—Loganiaceae	Semi-warm temperate	Wild	
Womb pain (syrup)	<i>Maguey del cerro</i>	<i>Agave atrovirens</i> Karw.	Warm, semi-warm climate	Wild and backyards	Native in Mexico
Stomach aches (syrup)	<i>Poleo</i>	<i>Mentha pulegium</i> L.	Warm, semi-warm, and temperate climate	Wild and backyards	Native in Mexico and Guatemala
	<i>Hinojo antiguillo</i>	<i>Foeniculum vulgare</i> (L.) Mill.	Warm, semi-warm, and temperate climate	Wild and backyards	
	<i>Marrubio</i>	<i>Marrubio vulgare</i> L.	Semi-warm temperate	Wild	
Ointments	<i>Flor de nochebuena</i>	<i>Euphorbia pulcherrima</i> Willd.	Warm, semi-warm, and temperate climate	Backyard	Native in Mexico and Guatemala
	<i>Duraznillo</i>	<i>Opuntia leucotricha</i>	Semi-warm temperate	Wild	
	<i>Ruda</i>	<i>Ruta graveolens</i>	Warm, semi-warm, and temperate climate	Backyard	
	<i>Sangre de grado</i>	<i>Jaatropha dioica</i> Cerv.	Warm, semi-warm climate	Wild	

^aSource: Manzanas Environmental Reports.

^bSource: Biblioteca Digital de la Medicina Tradicional Mexicana (2009).

^cFound and purchased in the market as well.

away from their households (FGs, 2017). Additionally, medicinal plants grow in backyards and in the forest. Thus, women used natural resources marginally as a complementary household survival strategy (PO, 2014).

Nevertheless, increasing women's demand for medicinal plants involved bargaining with communal authorities and landowners of private lands; women either required authorization from the communal authorities on communal land or paid a certain amount to the private property owners or both (FGs, 2015). The bargaining for access and use of natural plants involved communal and intra-household gender dynamics. One cooperative member explained: "Communal authorities enabled us to gather medicinal plants from the communal land because they know our job, natural medicine benefits the whole community. They ask us to be careful in order not to disassemble the forest" (FGs, 2014). Authorities approved the use of medicinal plants by women since they fulfill gendered duties to *care for* families and the community by providing natural medicine.

Intra-household gender dynamics involved the support of some husbands or male relatives when the members need plants from faraway places. A member stated: "He [husband] carried the plant, I showed him where and how to cut it" (FGs, 2016). Manzanas negotiated natural resource access—medicinal plant use—based on the approval of communal authorities, individual owners' perceptions of plant prices, and the support of husbands or male relatives. The benefits of natural medicine production are shared between humans and non-humans since reforestation practices in women's backyards and the sustainable practices of gathering of medicinal plants made its conservation and reappropriation possible through their management. At the same time, community and household members mitigated health issues with the natural medicine prepared by the cooperative.

Nevertheless, gathering in the forest and reforestation in backyards increase women's burden because they added to peasant activities and domestic labor. Additionally, women's commitment to community well-being is a crucial element to bargain for biophysical resources. These practices reinforced

existing gender norms such as female altruism because women needed to perform activities that increased others' well-being, even though they were tired; one member stated: "We are the first to wake up and the last to sleep" (FGs, 2015). Existing gender norms were also strengthened by naturalizing care responsibilities assumed exclusively by women in the cooperative.

Knowledge Commons

Women's collective efforts are intersected by peasant knowledge transmitted from mothers to daughters by recognizing gendered caring responsibilities to reappropriate biophysical commons through medicinal plant management. This gendered knowledge is recreated to develop the moral quality and technical competence among women as *caregiving*. One Manzanas member explained:

Our grandmothers taught us the use of plants to cure illness. We did not turn to medicine and doctors if we were ill. We drank *tecitos* [infusions] to ease the pain. My grandmother used to prepare "plant tamales" [cataplasm made from maize leaf and medicinal plants]. They heat it and put it in the affected area to reduce swelling (FGs, 2014).

Preserving medicinal plants by making syrup was the cooperative's first collective action to expand peasant knowledge. Another cooperative member explained: "Doña Maria came from Tehuantepec Oaxaca; she shared with us her syrup recipes and knowledge for caring plants. She was living with us for eight months. She learned from our plants too" (FGs, 2016). Additionally, women reinforced knowledge with several workshops offered by the non-governmental organization (NGO) and exchanges with other women's groups (FGs, 2015). Nowadays, Manzanas produces almost 50 products, including syrups, ointments, soaps, and tinctures, to attend to illnesses and improve children's nutrition based on the knowledge of more than 100 medicinal plants actively used in medicine production (FGs, 2019).

The Manzanas cooperative organized the labor to produce natural medicine. The members shared the responsibility by distinguishing peasant knowledge among their members. One of the younger members explained: "Our aunt knows plants; she supervises the plant quantity used in the medicine. She explains plant processing to us to take advantage of its nutrients" (FGs, 2014). Peasant knowledge is dynamic since the cooperative members experiment with new formulas, for instance, reducing sugar in syrup to make it more attractive to people with diabetes (PO, 2018).

The collective action bolstered by Manzanas reinvents and reappropriates the knowledge commons—peasant knowledge—to deal with community and household health needs. NGOs and local universities that have investigated the benefits of medicinal plants in human health supported their efforts. Although the tests are still experimental, scientific researchers collaborated with the cooperative by classifying medicinal plants based on scientific names and properties; the cooperative is the list owner (PO,

2016). In this taxonomic and ethnobotanical practice, women actively participated using their knowledge based on observation and experimentation *in situ*, while the researchers supported this knowledge. The Manzanas cooperative members are citizens who do science, and the scientists use the cooperative's efforts to improve people's well-being by identifying medicinal plant properties; this collaboration expanded the knowledge commons beyond the community scope. Thus, women's access to biophysical resources is interdependent on the expansion of the knowledge commons. In this process, gender dynamics shaped the collective organization related to caring responsibilities.

Social Commons

The Manzanas cooperative is an expression of social commons by the collectivization of social reproduction responsibilities. The members define the rules and protocols collectively according to their needs and advantages in order to keep working together. They organize the labor, distribute the benefits, and enact sustainable practices to produce natural medicine to cope with the shortage of medical services and meet the gendered responsibilities of caring. One member expressed: "As moms, we are attentive to illness" (FGs, 2014). Women assumed the responsibility of *caring for* their household members' health needs, and natural medicine facilitates these care responsibilities. Another member explained:

The syrups [natural medicine] save us time because it is ready if someone is ill; we no longer have to go to the mountains, cut the plant and prepare the infusion. We knew the plants, but we did not know how to prepare the syrup, soaps, and ointment (FGs, 2014).

Cooperative members, as *caregiving*, required moral and technical competence. These needs boosted Manzanas' strategies to negotiate the communal land property access in order to build the cooperative infrastructure by assuming the responsibility to *care for* their household members. In the focus group discussion, the members explained: "When we began with the natural medicine production, we did not have a place to produce it; we used the school backyard because it is a communal land" (FGs, 2013). Women knew the health needs of household members; however, communal authorities did not necessarily prioritize these needs. The members explained: "We had to speak several times with our neighbors, convince our spouses, and even go to the municipal president as a group of women. It was a struggle because they [communal authorities and husbands] did not recognize our demand" (FGs, 2013). In the Las Manzanas community, women did not usually ask for land; men are the landowner (plots and house). Most of the landowners inherited or bought the land. Initially, communal authorities assumed that women did not need land for their interests (PO, 2014). After 2 years of bargaining with the husband and male relatives, the communal authority donated a piece of communal land to build the cooperative facilities. One cooperative member explained:

We needed it [the land] for our workshop [cooperative facilities]. First, we organized our group. It took several workshops, and

many people supported us, including the vet and Enlace Rural Regional (NGO). The NGO requested funds. We negotiated the land, but we needed to build our workshop. Municipal authorities, NGOs, and our husbands provided funds and labor to build our workshop: The House of Medicine. We, as cooperative members, allocated a fund from sales (FGs, 2015)

Women built the “House of Medicine” in communal land. The collective facilities enabled the members to meet social reproduction responsibilities. For instance, the members planted vegetables in the greenhouse for selling or exchanging and baked bread for parties. The making of bread and the planting of vegetables are occasional, but through them, the members partially cover their concerns for a natural and varied diet from the collectivization of social reproduction tasks (PO, 2012, 2014). Despite their efforts, Manzanas members had to constantly demonstrate their commitment to community well-being, which increased the responsibilities of women members. One member explained: “Sometimes people ask if we are still working, we think that they want our cooperative” (FGs and PO, 2018). Although the authorities donated communal land and the collective facilities building was carried out by the cooperative, the members perceived that some community members did not agree with the collective-owned property by seeing them as temporary users of the communal land. In the focus group discussion, the members said:

We think that now that we have our workshop, the bakery, and the greenhouse, the neighbors can say that this land belongs to the community, so it belongs to everyone. However, they do not consider all the work we invested in it. We will defend our land and our cooperative. We have the document for donation (FGs, 2016).

This quote illustrates the tensions women faced despite having controlled their cooperative facilities for more than two decades. The collective organization has enabled Manzanas members to obtain a collective land property and acquire assets to deal with households and community health issues. However, the members noticed stalking in their work.

Although the cooperative members perceived the disagreement of some neighbors, other community members support them and trust their work by buying their products. The medicine is sold in the nearest local markets. The Manzanas cooperative sells the medicine at lower prices in their community since they are aware of local needs; this does not imply that members do not want to earn an income. One member explained: “We want to have an income, but also to support those who need it because we know their health needs” (FGs, 2016). Community members, as *care receiving*, support the cooperative when they need, for instance, extra labor as a form of reciprocity by recognizing this protocol. One communal authority (public transport driver) said: “Women are producing something good for us, so when they need to deliver the products, I support them” (CAI, 2016). Another communal authority expressed: “when women need a document from me as an authority, I provide it because they are responsible and their labor is an

opportunity for women to work” (CAI, 2014). The community authorities acknowledged women’s efforts to provide household and community well-being, and as a reciprocal action, they supported them.

Women’s collective efforts as a social commons are not isolated in the region; the oregano producer, the community water supply system, and the unpaid communal labor are expressions of social commons. The Las Manzanas and El Roble communities are working together to produce and sell oregano. Oregano producers sow individually, but training and sales are organized collectively by the cooperative (PO, 2018). The Manzanas cooperative and oregano producers—integrated mainly by men—exist concerning a web of commoning practices. For example, the water supply system supervises and controls the water distribution between the two communities of Las Manzanas and El Roble. An elected committee democratically organizes the water supply system. The authorities assume the responsibility of solving damages in the water pipes and *care for* the springs that feed it, contributing to community well-being. The heads of the households perform communal labor by integrating with the committee. Another expression of social commons is the mandatory unpaid community labor to maintain communal infrastructures, such as roads, schools, and the health house supported by the state. The Manzanas cooperative and oregano producers contribute to unpaid communal labor because they are part of the communities. These practices expanded the social commons; community relations maintain the necessary services used by these alternative enterprises, and communities support cooperatives when they need project authorization. However, the contribution of women to communal well-being increases their burden because communal labor is performed on behalf of the cooperative that is added to domestic labor, peasant activities, and communitarian responsibilities.

DISCUSSION

Examination of the gender dynamics carried out by the members of the Manzanas cooperative has described the negotiation process to access communal resources such as land and medicinal plants based on their collective needs of caring. The Post FPE lens illuminated how the Manzanas cooperative bolstered new ways of commons—commoning—by the interaction between the biophysics, knowledge, and social commons. Unlike the vision that considers women as temporary, transitional users of natural resources or focuses on their contribution to the productivity of the peasant household, the Post FPE lens elucidates how the cooperative members, for two decades, have overcome the gender dynamics that denied their interest in biophysical resources within the community and households. Instead, the gendered needs of caring and women’s situated peasant knowledge shaped their collective access to natural resources.

The cooperative members bargained in multilayer arenas. Within the community, women negotiated the use of communal land by showing ethical commitment to community well-being. The use of medicinal plants is negotiated with communal authorities and landowners, such as in other communities

where male-dominated local institutions defined the access, use, and control over natural resources, making women's use more expensive or inaccessible (Vázquez-García and Ortega-Ortega, 2016). Albeit national policy considered women's efforts in sustainability, it has a limited scope due to its short-term perspective. At the household level, women use medicinal plants marginally without compromising the central peasant household resources—oregano—managed by men in their role as heads of households and as producers (Deere, 2011).

The cooperative members' struggle for communal land involved human and non-human relations to face health and ecological issues. Medicinal plants became companion species (Haraway, 2016); they are *cared for* and managed by the Manzanas cooperative members to deal with community health issues. The cooperative reappropriates medicinal plants by reproducing them in their backyards, controlling the harvesting, and elaborating natural medicine production protocols. Instead of focusing on women as victims, this Post FPE perspective (Harcourt and Nelson, 2015) elucidates how the cooperative members reinvent the use of plants by recuperating peasant knowledge and experiences to create innovative natural medicine. The Manzanas cooperative achieved long-term agreements and control over communal land by defining protocols based on the interdependence between the biophysical, knowledge, and social commons. In this relational process, the Manzanas cooperative negotiates for resources considering medicinal plants and the well-being of the community members. The cooperative bolstered new ways of exchange by expanding knowledge of medicinal plants and incorporating NGO and scientific in the property classification of medicinal plants. Cooperative members are citizens who do science supplemented by external actor supports (Bhattacharjee, 2005). The collective knowledge strengthens the cooperative and the medicinal plant community by identifying their effects on human health and creating sustainable and diversifying strategies to preserve medicinal plants through the organization of labor.

The collective efforts of Manzanas illustrated the feminist ethics of care by showing the multispecies relations to sustain human and non-human life. Instead of focusing exclusively on natural resources as the base of capital accumulation, the Manzanas cooperative members use biophysical resources governed by social and moral commitments to preserve human and non-human communities. The medicinal plant gathering practices of the Manzanas cooperative are related to the subsistence ethic observable in other Mexican cases (Vázquez-García and Ortega-Ortega, 2016). Care as a process lens illuminated the reciprocity forms performed by community members as *care receiving* who acknowledge the efforts of members of the women's cooperative and support them in response—supplemented by the social commons such as unpaid communal labor and other local cooperatives. The Manzanas cooperative created alternatives to access, use, and control biophysical resources by cultivating human and non-human relations that augment their capacity to deal with the insufficient state health services as an expression of precariousness and environmental issues.

Albeit the Manzanas cooperative members are excluded from the collective land rights established in the Agrarian Law by

not having social property, the members bargained based on satisfying their household, community, and environmental needs of caring. The cooperative employed diverse commons—social, biophysical, and knowledge—to use and control communal land and medicinal plants. This does not mean that the law is not necessary to obtain collective land rights, especially for women—such as the case of WAIU considered in the Agrarian Law—but rather that the cooperative members looked for alternatives to deal with the problems, including the lack of access to collective land and health services. Moreover, Manzanas advocates the redistribution of land to produce fundamental values such as natural medicine by collectivizing social reproduction tasks and moving toward livelihood sovereignty (Tilzey, 2018, 2021). The Post FPE illuminates women's voices and experiences in controlling natural resources embedded in situated gender dynamics and structural constraints exacerbated by the neoliberal trend that encourages individual land property. The perspective discusses how multispecies are engaged in the preservation of commons by focusing on the interdependence between the biophysical, social, and knowledge commons and how gendered responsibilities of caring play a crucial role in this commoning.

Although women's efforts achieved access to communal land where they built the “House of Medicine” to produce natural medicine, these efforts increased their burdens and tensions within the household and community. Collective practices reinforced the existing gender norms such as female altruism at the household and community levels by focusing on satisfying gendered caring responsibilities assumed exclusively by women. Contradictorily, by fulfilling existing gender norms, the cooperative members bargain access to communal land and biophysical resources. By recognizing female altruism, and women's contributions to community well-being, communal authorities donated communal land. Although the Manzanas cooperative has used and controlled the communal land for more than two decades based on commoning—the interdependent process between the biophysical, knowledge, and social commons—members perceived the scrutiny of some neighbors who still considered women as temporary users of communal land despite their efforts to provide household and community well-being.

CONCLUSION

This article has shown the bargaining process performed by peasant women to access and control biophysical resources such as communal land and medicinal plants by the collectivization of caring responsibilities employing the Post FPE approach, which sheds light into the gendering access to natural resources and land. Furthermore, we examined the strategies of the women cooperative members to negotiate in multilayer arenas by identifying the caring process and the actors involved. The strategies included the interdependence of the biophysical, social, and knowledge commons to maintain the production of natural medicine and control of the collective facilities. Although the perspective highlights women's voices and experiences to deal with precariousness, in our case related to the insufficient availability of medicine for rural people, our aim was not to

romanticize women's efforts since assumed caring responsibilities increased women's burden and reinforced the existing gender norms. Women's relations with medicinal plants do not stem from some essentialism, but are partly due to the state's structural inequalities—including gender and lack of access to collective land—and the state's failure to provide welfare for Mexican rural people. Performing diverse strategies to access natural resources is also due to the limited recognition of women's efforts to preserve human and non-human communities. Highlighting a feminist ethics of care observed in women's care practices broadens pathways to support women's efforts and design transformative policies to address the inequities women face in accessing natural resources by prioritizing subsistence needs and providing local and sustainable livelihoods rather than just focusing on productive purposes.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JS-A and DG-G contributed to the conception and design of the study and wrote sections of the manuscript. JS-A collected, organized, and conducted the primary analysis of the data. All authors contributed to the article and approved the submitted version.

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