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HARVESTING INSIGHTS FROM THE CONVERGENCE OF SOCIOECOLOGICAL
SYSTEMS (SES) RESILIENCE AND FEMINIST POLITICAL ECOLOGY (FPE) IN
AGRICULTURAL COMMUNITIES IN THE SOUTHERN GREAT PLAINS

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BY THE COMMITTEE CONSISTING OF

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ABSTRACT

Women in agriculture have been identified as an important research area at national and international scales to support resilient agricultural systems. Intersectional analyses of SocioEcological Systems (SES) resilience frameworks are increasingly necessary to investigate complex, context-specific social dynamics, including gender. Feminist Political Ecology (FPE) provides a complementary lens for studying gender in SES while benefiting from the broad applicability of SES frameworks. FPE approaches the individual and the social group within their context, recognizing that gender can influence one's adaptive capacity. This mixed-methods research project is based in Cimarron County, OK, and Union County, NM, and advances a convergent SES and FPE framework to examine how women in rural agricultural communities foster SES resilience. Key SES-FPE components identified include environment, economics, production, institutions, community, and intrahousehold dynamics. Comparisons are drawn between the United States Department of Agriculture's Census reports, oral histories of Dust Bowl survivors, and key informant interviews. Agricultural Census results reveal the increasing formal representation of women in agriculture, as heads of household, landowners, and/or producers. Qualitative results, however, reveal that women have always been intimately involved in agriculture, if not sometimes unseen. Their stories illustrate the complex pathways women navigate in support of agriculture and agricultural communities during SES disruptions. Overall, results show the role of women in agriculture, from the individual to the national scale, and the shared experiences of women when fostering SES resilience. Taken together, converging SES and FPE frameworks provide an intersectional analysis of SES, treating social differences as a crucial component to inform resilience strategies.

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CHAPTER I – INTRODUCTION

1.1 Problem Statement

In the age of the Anthropocene, an era marked by intense human activity on the environment, the threats of climate change are multifaceted and continue to alter the earth (Mann and Kump 2015). Humans have greatly contributed to these environmental changes, drastically transforming the basic functioning of natural systems (Turner II et al. 1990). Of the human activities driving these changes, agriculture is a key human-environmental relationship that is rapidly transforming the earth as operations intensify to meet demand (Meyfroidt 2016; Vadjunec, Radel, and Turner II 2016). Additionally, these environmental changes pair with changes to livelihoods, where agricultural decisions ebb and flow based on available natural resources (Turner II, Lambin, and Reenberg 2007; Vadjunec, Radel, and Turner II 2016; Sunderland et al. 2017). As such, investigating the complexities of agriculture and the differences among its actors as a key human-environmental relationship is important for international, national, and local initiatives. Globally, the United Nations Paris Agreement (2016) established 17 sustainable development goals, which include promoting equality amongst actors and reducing inequalities that have been connected to promoting sustainable futures, where women actors have been highlighted as a necessary point of investigation (United Nations Climate Change n.d.). Similar findings are seen in national scales as well, with the United States Department of Agriculture (USDA) recognizing the importance of women agriculturalists (USDA NASS 2022b).

Socioecological systems (SES) thinking has been used to model human-environment relationships to investigate the interdependent social and environmental relationships and interactions on a broader scale, especially in agricultural communities (Vallejo-Rojas, Ravera, and Rivera-Ferre 2016; Wenger, Vadjunec, and Fagin 2017; Skog et al. 2018; Fagin et al. 2024). SES

approaches frame the complex network of actors within human and natural subsystems into a larger, interconnected system with complex multiscale and multitemporal feedbacks (Turner II et al. 1990; Berkes and Folke 1998; Anderies, Janssen, and Ostrom 2004; Ostrom 2009). When a SES experiences a disruption or change, adapting to these changes is considered SES resilience (Holling 1973).

To further define, *SES resilience* refers to a system's ability to self-organize and restructure by learning from and adapting to SES disruptions or changes through the acquisition of new skills, lessons, or management techniques (Adger et al. 2005; Cutter et al. 2008; Berkes 2017). Resilience has been used as a unifying concept for international, national, and local initiatives addressing environmental change to identify and investigate the iterative context of SES using a systematic analytical framework (Anderies, Janssen, and Ostrom 2004). For agricultural communities, changes in SES can affect both production and livelihoods, which are often intertwined. In the United States, SES approaches have been used to investigate how international and national demand can intensify statewide or local-level agricultural production to help improve efforts to cope with SES changes (for example see Cumming, Cumming, and Redman 2006).

The Southern Great Plains (SGP) is a significant agricultural region in the United States. The area is globally and nationally known as the “breadbasket” producing vital grains, livestock, and crops for multiscale markets (Sanderson and Frey 2014, 517). However, the area is prone to cyclical droughts that disrupt agricultural production and livelihoods, leaving lasting impacts (Carrasco Galvan, Vadjunec, and Fagin 2024). Thus, understanding the interactions between actors in SES in the area requires context-specific approaches that incorporate local and regional factors. In the SGP, SES approaches have been helpful for understanding how natural resource policies impact agricultural production, both within and between states. SES frameworks also emphasize

the need for integrative approaches to SES that include on-the-ground household and community perspectives (Fagin et al. 2016, 2024; Vadjunec et al. 2018).

Originating from ecology, the term ‘resilience’ has undergone several iterations as applications of resilience now extend beyond ecology to incorporate social systems (Alexander 2013; Cretny 2014). SES resilience occurs in ecological *and* social systems, where, like ecological systems, social systems are complex and filled with interconnected components, feedbacks, and actors that cannot be treated under the same principles as ecological systems that vary based on context (Anderies, Janssen, and Ostrom 2004; Adger et al. 2005). Thus, social resilience processes can include decision-making processes, dynamic & situated power knowledge processes, and adaptations to SES threats, among others, all of which are dependent on the context of SES and the positionings of the actors within them (Adger et al. 2005; Nightingale 2023). To approach gender in agricultural SES, further theoretical framings are necessary to add to the systematic analysis of SES frameworks.

When considering gender, feminist theorists have noted gender in power hierarchies and social structures that favor some and perpetuate inequalities through exclusion, unequal access, and limited agency for others (Butler 1988, 1990; Nightingale 2023). Women, in particular, face unequal access and agency in formal institutions that cause women to pursue other means of cultivating resilience in their communities (Campbell 2013; Aregu et al. 2016; Nightingale 2023). For the case of gender, resilience studies require further in-depth analyses of how social systems are structured by gender and how gender influences relationships and interactions in SES (Cote and Nightingale 2012). Feminist political ecology (FPE) can add to SES resilience frameworks by treating gender as a critical variable in shaping people's relationships with their environment (Rocheleau, Thomas-Slayter, and Wangari 2013). FPE has been used with SES frameworks to

understand the factors that affect women agriculturalists' ability to cope with SES changes (Aregu et al. 2016). This thesis project looks at how women participate in agriculture and foster SES resilience in rural agricultural communities in Cimarron County, OK and Union County, NM.

Communities in Cimarron County, OK and Union County, NM, have deep-rooted histories in agriculture. Many of these histories begin in the late 19th century onward, developing adaptations to new SES changes over time (Carrasco Galvan, Vadjunec, and Fagin 2024). Since initial settlement, agriculture has become a staple and foundation of the economies and lifestyles of the many communities in the area (Vadjunec and Sheehan 2010; Young n.d.). However, both counties have long histories of cyclical drought, including the infamous Dust Bowl, that affect the intertwined relationship between community livelihoods and agricultural production. Yet, communities remain resilient during and after such disastrous socioecological disruptions (Wenger, Vadjunec, and Fagin 2017). However, many agricultural communities in the region are being whittled away as competition among producers and resource scarcity uproot many families from the area (Vadjunec and Sheehan 2010; Colston, Vadjunec, and Fagin 2019). How these communities adapt to SES changes and disruptions varies with individuals' backgrounds, resources, and positions within the SES. In the case of Cimarron and Union County, further research on gender and women in agricultural communities is necessary to understand the multifaceted ways resilience is cultivated and pursued.

The guiding research questions are as follows:

1. How has women's participation in agriculture changed from 1978 to the present?
2. How do women in rural communities participate in agriculture and contribute to SES resilience?
 - a. How/has women's participation in agriculture changed over time?

- b. What are women's opportunities and barriers for participating in agriculture and SES resilience?
 - c. In what ways do women impact overall SES resilience in agricultural communities?
- 3. What are the broader implications for agricultural policy and SES resilience?

Using a mixed-methods approach, this research aims to provide a comprehensive analysis of the challenges and opportunities women in agriculture face as they adapt to SES changes and threats. This project combines SES resilience frameworks (Folke et al. 2010; Cote and Nightingale 2012; Cretney 2014; Cutter, Ash, and Emrich 2014) with FPE frameworks (Rocheleau, Thomas-Slayter, and Wangari 2013) to fill the gender gap in SES resilience research and fit FPE within a systematic analytical framework that is important to broader scientific and multitemporal/multiscalar initiatives. First, the overall climate and environmental conditions of the Great Plains are explored, followed by a discussion of the region's importance in national and global agricultural markets. Next, women agriculturalists in the United States are discussed. Lastly, the context of the study area follows, focusing on the present-day context. Finally, the trajectory of women in agriculture in the Great Plains is reviewed.

1.2 Study Area Background

1.2.1 Agriculture in the United States

Agriculture in the United States is a core sector of the country's economy and a contributor to land use patterns. The food and agricultural sector produces ~\$543 billion a year with livestock accounting for almost half of this revenue (USDA NASS 2022f). Roughly 876 million acres are used for agricultural purposes (Rathore 2026). In 2022, the USDA reported over 3.37 million producers (USDA NASS 2022b). The composition of producers, however, varies, where women make up far less than the majority.

1.2.2 Women in Agriculture in the United States

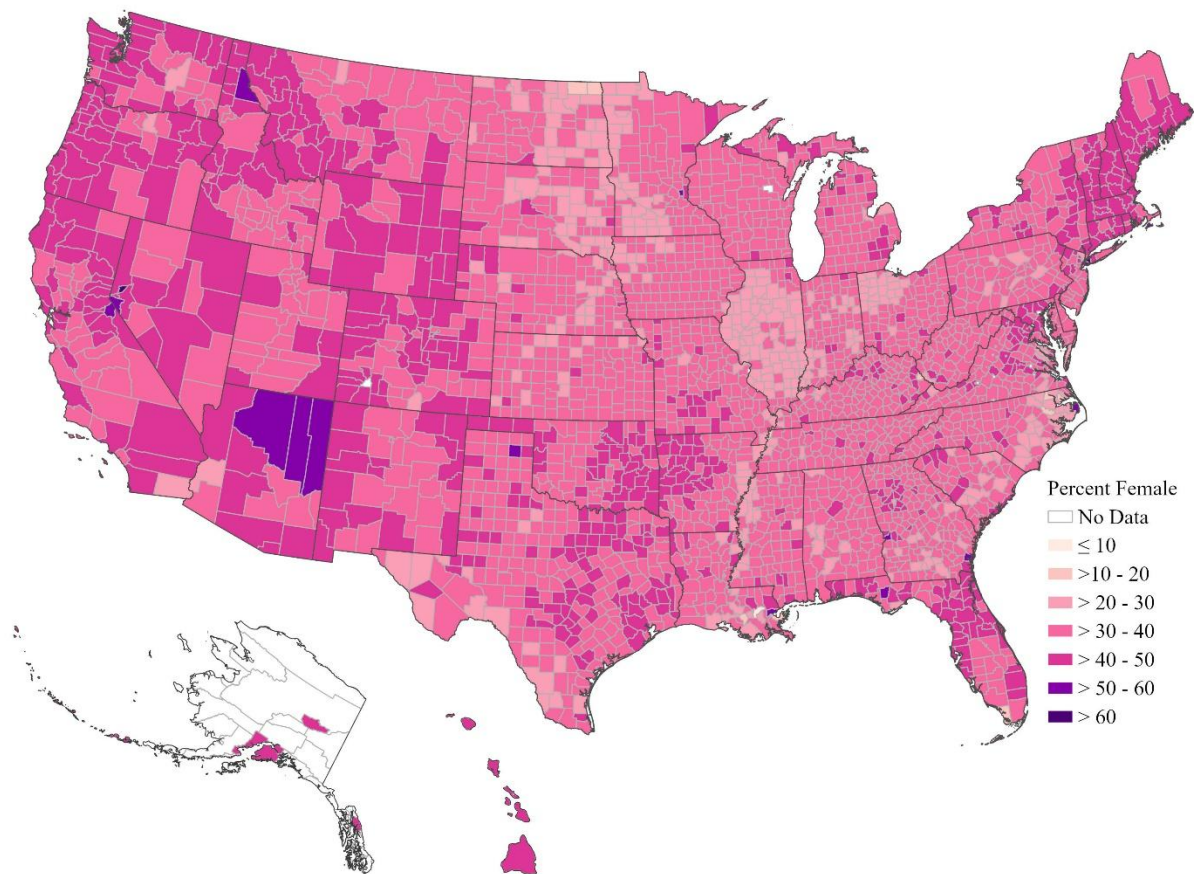


Figure 1: Percentage of female producers out of total producers per U.S. county (2022). Figure created by the authors using data layers from the U.S. Census Bureau and producer data sourced from the United States Department of Agriculture National Statistics Service.

In the United States, female agriculturalists have been identified as an important and growing group involved in the nation's food systems. Women make up 1.2 million producers, manage over 407 million acres of land, and generate over \$222 billion in national revenue from farms with at least one female producer (USDA NASS 2022b). Today, women agriculturalists continue to be identified as drivers of local economies. Women account for 36% of total producers and are 33% “more likely to be a beginning farmer” (USDA NASS 2022b, 1). New agriculturalists

may be more susceptible to variability in environmental conditions and market changes when financial cushions built over generations are unavailable (Key 2019). Women often face unequal access to land and income disparities, and they make up 60% of new farmers (AFT n.d.). Regarding labor divisions, the USDA (2022, 2) reports that, nationally, women are more likely to be involved in day-to-day decisions, including recordkeeping and financial management, while men are more likely to be involved in land-use decisions and in the management of crops and livestock. However, these statistics represent the country, and small-scale views, such as at the county level, may differ from these national perspectives. In the following section, the background of the study area and the relevance of past research to this thesis will be discussed.

1.2.3 Environmental Conditions and Agriculture in the Great Plains

The Great Plains region includes all or part of the U.S. states of Texas, New Mexico, Oklahoma, Colorado, Nebraska, South Dakota, North Dakota, and Montana, and stretches into Canada (Wishart 2011). The Great Plains are largely composed of sprawling grasslands and steppe, characterized by climate variability and drought, with agriculture as a primary land use (Scholtz and Twidwell 2022). The Great Plains region is large, so climates vary widely between months and locations. In general, the Great Plains are dry with few bodies of surface water since the region is in the middle of the continent (Leathers and Wishart 2011). Yet, despite these climatic conditions and limited access to surface water, commercial agriculture has become an important staple of the region.

The Great Plains is an important agricultural sector, known as the “breadbasket,” of both the United States and the world (Sanderson and Frey 2014, 517). Agriculture has a long history in the Great Plains, beginning with Native American agriculture, and Western settlements in the 1800s were enabled by the Homestead Act of 1862 (NPS 2022). Early European American

settlements in the Great Plains quickly found that the region's dry climate limited the variety of crops that could be grown. In initial expansions into the Great Plains in the late 19th century and into the early 20th century, the land was perceived to be highly productive, and where “the rain follows the plow” (Libecap and Hansen 2002). This perception led agriculturalists to overplow the land despite the Southern Great Plains' proclivity for cyclical droughts, creating dusty landscapes where native grasses had held the soil in place before land-use changes (Hurt and Wishart 2011).

Technological advancements helped agriculturalists in the area adapt to the climate and terrain, including steel plows to turn sticky clay soil, increased use of windmills, alternative cultivation techniques, and early irrigation projects in the 1900s that tapped into groundwater resources (Hudson 2011; Carrasco Galvan, Vadjunec, and Fagin 2024). Today, agriculture has greatly expanded, where major commercial farming operations primarily include wheat, sorghum, cattle, and sheep (Hudson 2011; Carrasco Galvan, Vadjunec, and Fagin 2024). Given the broad range of the Great Plains, delving deeper into the regional specifics of the Southern Great Plains can reveal the unique environmental constraints and adaptations agriculturalists have made in the study area.

1.2.4 Environmental Conditions and Agriculture in the Southern Great Plains

The Southern Great Plains is known for its semi-arid environment, long histories of cyclical drought, and prominence of agricultural productivity. In the early years, as Western settlers moved in, the land was largely dependent on rainwater until federal funding for irrigation projects allowed the expansion of agricultural land in the early 1900s (Carrasco Galvan, Vadjunec, and Fagin 2024). However, the encouragement of westward expansion and policies to intensify agriculture in the area did not account for the constraints imposed by environmental conditions. Drought is a recurring environmental stressor in the Southern Great Plains, affecting both social dynamics and

ecological conditions. Drought is generally understood as the absence or deficiency of water over an extended period, but the context of drought matters (NIDIS n.d.). In agricultural settings, prolonged water scarcity or droughts are characterized by soil moisture deficits, crop failures, and reduced groundwater levels (NWS 2006; Disasa et al. 2026). Perceptions of drought and the ways individuals communicate about it can vary by context, influenced by regional and local climatic factors and socioecological histories.

In the 1930s, the Dust Bowl, an infamous socioecological disaster, uprooted agricultural production and many families from the Southern Great Plains. Since agricultural communities' livelihoods depend on the environment, the effects of the Dust Bowl were catastrophic, including unsafe environmental conditions, economic downturns and market fluctuations, and difficulties maintaining production amid dry, less profitable conditions (Worster 2004). The Dust Bowl is but one of many severe droughts in the Southern Great Plains. More severe droughts than the Dust Bowl followed, including those of the 1950s, 1970s, 1990s, 2001 to 2003, and 2010 to 2014 (Kostis 2012; Wilhite 2025). Each drought introduced new difficulties to overcome and forced agriculturalists to adapt and anticipate extreme drought conditions.

Agricultural communities experienced numerous negative impacts of the drought, including crop failures, limited and poor-quality rangeland, herd reductions, and large economic impacts, making recovery more difficult (Baule et al. 2025). The spatial extent and intensity of these droughts increased over time, causing many producers to adopt more water- and land-intensive operations, often capitalizing on groundwater as a stable water source. New technologies, such as center pivot irrigation or genetically modified crops, can make production more stable and increase profits and returns (Wenger, Vadjunec, and Fagin 2017; Carrasco Galvan, Vadjunec, and Fagin 2024). Thus, agriculture is rapidly changing to anticipate and overcome these challenges.

1.2.5 Study Area

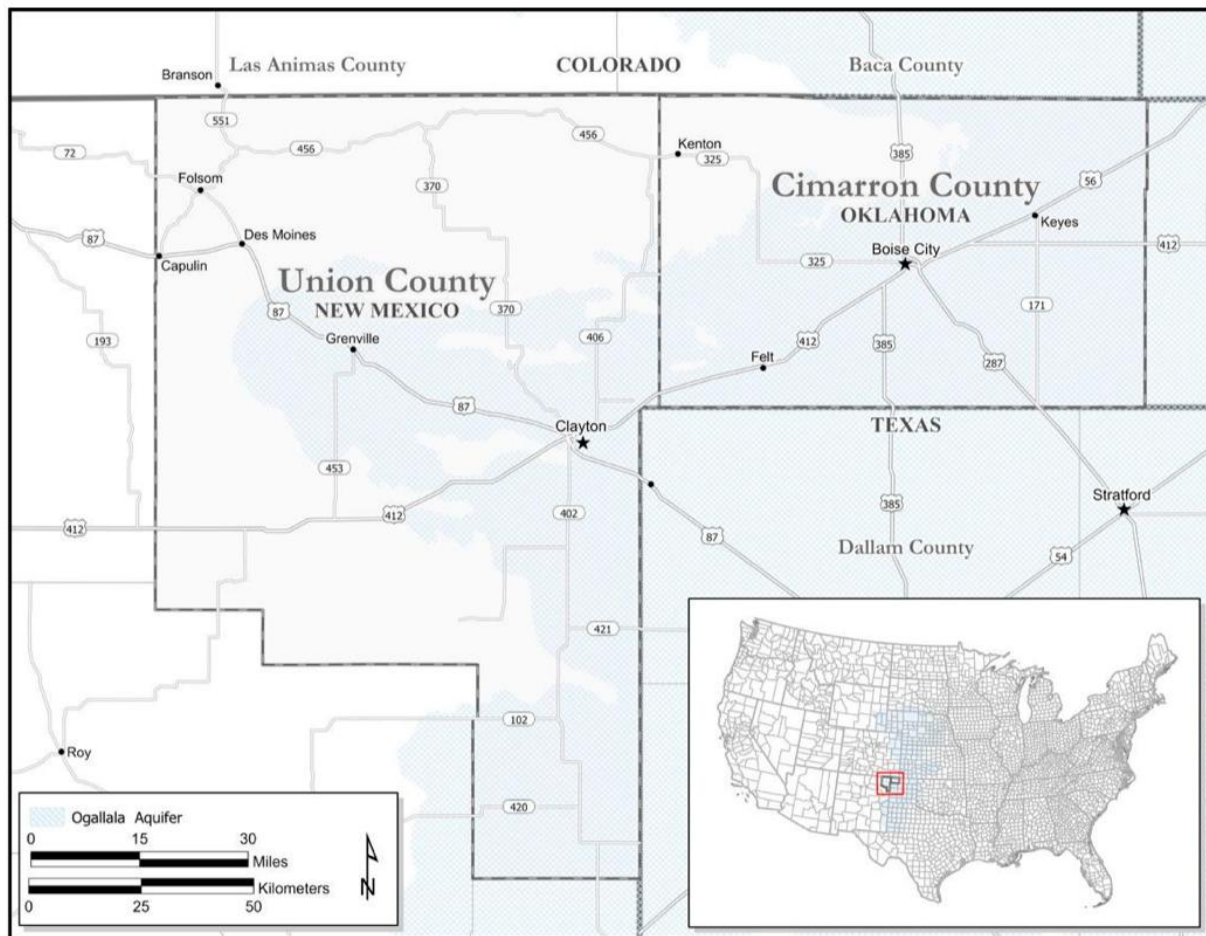


Figure 2: Map of the study area depicting the Ogallala Aquifer, Cimarron County, OK and Union County, NM. (Source: Vadjunec et al. 2022, 4, used with permission)

The study area focuses on agricultural communities in Cimarron County, OK, and Union County, NM. The two counties are part of a past and ongoing research project (funded by the USGS, USDA, & NSF) on long-term adaptation and resilience to drought in rural, agricultural communities. This transdisciplinary, team-based project has been led by committee chair Dr. Vadjunec since 2008 (Vadjunec et al. 2021, 2022). Previous work includes studying the impact of contentious policies related to state school land (Vadjunec and Sheehan 2010), woody plant encroachment (Fagin et al. 2016; Vadjunec et al. 2022), the spread of center-pivot irrigation and

its influence on natural resources (Wenger, Vadjunec, and Fagin 2017), the historical impact of agricultural policies (Carrasco Galvan, Vadjunec, and Fagin 2024), the importance of social capital in SES (Straub, Vadjunec, and Fagin 2024), and how communities perceive environmental threats that influence overall resilience (Colston, Vadjunec, and Fagin 2019), among others. Both Cimarron County, OK and Union County, NM are part of the nation's "breadbasket," a crucial agricultural sector for national and international markets (Sanderson and Frey 2014, 517) and well suited to investigating women and agriculture.

The two neighboring counties are found in the Southern Great Plains. Cimarron County, OK is the westernmost county in Oklahoma's panhandle, and Union County, NM is found in the northeastern corner of New Mexico, bordering the western portion of Cimarron County, OK (henceforth Cimarron County and Union County). Despite being separated by county and state boundaries, communities in the two counties share similar experiences and livelihoods that intricately tie individuals to the land and agricultural lifestyles. Cimarron County and Union County will now each be discussed in detail, focusing on the different climates and agricultural production, followed by a discussion of the two counties together.

Cimarron County, OK

Cimarron County, the most western county in the Oklahoma panhandle, borders four states: Texas, New Mexico, Kansas, and Colorado. The total population of Cimarron County as of 2023 is 2,247, spread over the county's total area of 1,835 square miles (USCB 2023a). Cimarron County's population density is 1.22 per square mile. Most of Cimarron County is white, at 93.3% of the total population, with the next-largest category, two or more races, at 3.7% (USCB 2025). In 2025, the average maximum temperature was 72.8°F, and the average minimum temperature

was 41.8°F. On average, Cimarron County receives 17.15 inches of rain annually (NOAA NCEI 2026b).

Agriculture is prominent in Cimarron County, accounting for 1,806 square miles, or 98.4% of the total county's land area (USDA NASS 2022a). Approximately 36.38% of the agricultural land in Cimarron County is used as cropland, while 61.84% is used for pastureland. The remaining 1.78% is either cropland or fits in an "other" category (USDA NASS 2022a). In the latest USDA Agricultural Census report, Cimarron County had 432 farms. Major crops include wheat, sorghum, forage, corn, and cotton, ranked respectively. In crop sales, Cimarron County is ranked 7th in Oklahoma. Livestock is primarily cattle and calves, and the county ranks 4th in the state for livestock and product sales. 83% of agricultural sales were from livestock, poultry, and products, while 17% were from crops (USDA NASS 2022a).

Union County, NM

Union County, in the northeastern corner of New Mexico, borders Oklahoma, Texas, and Colorado. The total population of Union County is 4,039, with a population density of 1.06 people per square mile (USCB 2023b). Most of Union County is white, at 89.8% of the total population, with the next-largest category, American Indian and Alaska Native, at 3.9%, followed by Black at 2.5% (USCB 2025). In 2025, the average maximum temperature was 69.4 °F, and the average minimum temperature was 39.0 °F. On average, Union County receives 17.01 inches of precipitation, which is slightly less than Cimarron County (NOAA NCEI 2026a).

Like Cimarron County, agriculture is prominent in Union County. Across the county, 3,009 square miles are used for agriculture, accounting for 78.7% of the county's total area of 3,825 square miles. Approximately 2.98% of agricultural land in Union County is used for cropland, while 92.26% is used for pastureland (USDA NASS 2022e). Major crops include corn, forage,

wheat, and sorghum, ranked respectively. In crop sales, Union County is ranked 9th in New Mexico. Livestock is primarily cattle and ranked 7th in the state for cattle and product sales. Overall, 75% of total agricultural sales were from livestock, poultry, and products, while 25% were from crop sales in 2022 (USDA NASS 2022e).

Similarities between Cimarron County, OK and Union County, NM

Both counties have similar climates and available environmental resources. Cyclical droughts can be disastrous, and variable precipitation makes it difficult to maintain agricultural operations (Wilhite 2025). One avenue for overcoming water scarcity includes tapping into groundwater, including the Ogallala Aquifer (depicted in Figure 2) and other smaller aquifers and acequias in the counties (Fernald and Guldan 2004). Irrigation typically draws from groundwater, with very few cases using surface water. Many operations are dryland farms, yet producers often diversify their operations to include irrigation in case of environmental disasters. Additionally, the counties have federal funding to continue agricultural operations despite the limitations and variability of environmental conditions (see Table 1).

Table 1: Agricultural statistics from the United States Department of Agriculture Census Reports.

County	Cimarron	Union
Agricultural Land mi ² 2022 (%)	1,806 (98.4)	3,009 (78.7)
Cropland (acres)	420,400	57,516
Pastureland (acres)	714,757	1,776,692
Crop revenue (\$1,000)	59,761	21,341
Ranch revenue (\$1,000)	294,500	65,088
Government payments (\$1,000)	16,045	3,873
Disaster Subsidies (\$1,000)	20,760	5,357

Sources: Agricultural land was found using the total area reported in the United States Census Bureau (USCB 2023a, 2023b) minus the reported agricultural lands in the USDA Census Reports for 2022 (USDA NASS 2022a, 2022e). Disaster subsidies drawn from the Environmental Working Group for 2022 to match other datasets (EWG n.d., n.d.).

In previous work by Colston and colleagues (2019), the lasting impact and long history of dealing with cyclical drought led community members to define drought as a lack of rain, which negatively impacts both agricultural operations and livelihoods. In particular, households cite difficulties in maintaining grasslands and rangelands for cattle, lack of well water fed by surface or groundwater, and the socioeconomic impacts of drought on agricultural livelihoods (Colston, Vadjunec, and Fagin 2019). Additionally, overcoming cyclical droughts such as the Dust Bowl and following droughts in the 1950s and 2010s have become ingrained in community identities as a rite of passage (Carrasco Galvan, Vadjunec, and Fagin 2024; Wilhite 2025). The focus of this study concerns women in these agricultural communities. Next, women in the Great Plains will be discussed both broadly and narrowly within the study area, as large-scale perspectives on women in agriculture inform county-level experiences.

1.2.3 Women in Agriculture in the Great Plains and Study Area

In the Great Plains, women have historically played a crucial role in agriculture. Female Native American agriculturalists were integral to the management and maintenance of local economies, and this continued into the 20th century, when westward expansion pushed many Native communities out (Hudson 2011). When the Homestead Act encouraged settlement in the Great Plains, women were often key to managing the household environment while also providing crucial labor and overseeing agricultural production (Handy-Marchello 2011; Hudson 2011). Many women oversaw household-level agricultural production, including home gardens and livestock, which became crucial for generating income when crop prices were low. The hard living conditions and difficulties getting started in agriculture are noted as being a “temporary departure

from desirable gender arrangements” (Handy-Marchello 2011) where a “flexible labor force” was necessary (Flora and Flora 1988, 195).

During the First World War, around 20,000 women were recruited from urban areas to continue production through the Women’s Land Army of America when many men were drafted (Vilhauer 2021). Women’s involvement in agriculture continued and often entailed holding jobs outside of agriculture in town for a stable income (Flora and Flora 1988; Vilhauer 2021). In addition to maintaining intrahousehold farmyard work, women have often been involved in many agricultural-related organizations, including the Farmers Alliance, county Extension Services, Farmers Institutes, Rural American Women, among others. Yet, leadership roles were more often held by men until the 1980s (Riley 1985; Handy-Marchello 2011). Agriculture continued to grow in the Great Plains, where women's role in for-profit agriculture increased as traditional heterosexual gender roles were challenged and women's leadership was accepted. Institutional resources have been pivotal for women in this field.

Important resources for women agriculturalists in the Great Plains include organizations such as the Rural American Women organization, Extension Services, and the Farm Bureau (Riley 1985). In general, the county Extension Services provide important educational and professional opportunities for agricultural communities. These Extension Services occur through cooperations between the USDA and land grant universities to develop programs that meet the needs of communities in the area (USDA NIFA n.d.). Key programs include topics on nutrition, gardening, sustainable agricultural practices, farming and ranching practices, life skills, and also serving as a place of community (NMSU 2018; Hinsdale et al. 2026). Other associations with programs specifically for women include the National Women in Agriculture Association and the American Farmland Trust, which recognize the different positioning of women that requires attention in

agricultural policy and support (AFT n.d.; NWIAA n.d.). These institutions, however, are one piece of the puzzle. In the Southern Great Plains, the effects of socioecological disruptions, such as drought and the harsh climate, can intensify the already difficult agricultural business for women. Thus, it is necessary to understand the demographic composition of each county.

Table 2: General statistics for Cimarron County, OK, and Union County, NM in 2023 from the United States Census Bureau (USCB 2023a, 2023b) and the United States Department of Agriculture National Statistics Service (USDA NASS 2022a, 2022e).

County	Cimarron	Union
Area mi ²	1,835	3,825
Total Population	2,247	4,039
Population Density mi ²	1.22	1.06
Women 2023 (%)	1,115 (49.6)	1,858 (46)
Men 2023 (%)	1,132 (50.4)	2,181 (54)
Under the age of 18	21%	21%
Ages 18-24	52%	56%
Ages 65+	27%	23%
Producers Total	821	609
Female Producers (%)	372 (41.52)	249 (40.88)
Male Producers (%)	524 (58.48)	360 (59.11)

In both counties, men constitute a higher percentage of the total population, though the difference is marginal in Cimarron County (see Table 2). Women make up less than the majority in 2023. These minimal differences in the total composition of the counties do not reflect differences between female and male producers. In 2022, there were 821 producers in Cimarron County and 609 in Union County. In Cimarron County, 372 (41.52%) of these producers were women, and 524 (58.48%) were men (USDA NASS 2022a). In Union County, there were 249 (40.88%) female producers and 360 (59.11%) male producers (USDA NASS 2022e). Compared with men, women own much smaller farms and ranches and therefore receive a smaller share of agricultural subsidies, with female-headed farms receiving only 20% of the subsidies in each

county (Ramirez Saenz et al. n.d.). Therefore, despite the long histories of women in agriculture across the broader Great Plains, women's institutional support is far less than that of men in the study area, suggesting a need for in-depth analyses of women in agricultural communities in the two counties.

Continuous and cyclical SES disruptions, such as drought, have led two counties to experience drastic changes and threats to community livelihoods (Worster 2004; Carrasco Galvan, Vadjunec, and Fagin 2024). In particular, the agricultural communities have emphasized changes in livelihoods and unstable state support given to these communities (Vadjunec and Sheehan 2010). Since governance and SES disruptions affect social groups differently, engaging with women agriculturalists and understanding these communities' histories is crucial to this thesis's work.

1.3 Significance and Broader Impacts

Calls for further investigations of female agriculturalists have become a noteworthy expansion of both national and international sustainability initiatives. This can be seen in the United Nations Paris Agreement Sustainable Development Goals that identify women as a key to sustainable futures (UN n.d.). Numerous national organizations, such as the American Farmland Trust and the National Women in Agriculture Association, share this view and aim to cultivate resources for female agriculturalists (AFT n.d.; NWIAA n.d.). Although there are calls for research on women in agriculture, researchers who study resilience often short shrift gender as a critical, multifaceted variable influencing the social capacities to remain resilient in times of distress. Thus, this project aims to further contribute to SES resilience literature by continuing gender-specific analyses of SES resilience (Aregu et al. 2016; Dah-gbeto and Villamor 2016; Ravera et al. 2016). Case studies such as this one can provide solutions or potential areas for supporting women in

agriculture that have broader applications across the Great Plains and other agricultural communities.

Conceptualizing SES resilience that incorporates social differences is an ongoing discussion (Cutter 2016; le Polain de Waroux et al. 2021). This thesis project can further bridge the gap in the resilience literature and in the application of FPE to case studies, continuing the conversation about how resilience is produced and achieved. While several studies have combined FPE and SES and interrogated gendered capacities to adapt, it is hoped that this thesis project will provide new understandings regarding the impact of gender and other social differences on a given social group's adaptive capacity to foster SES resilience. Thus, the primary audience is researchers who are interested in the varying ways social structures influence resilience. Furthermore, the SES-FPE theoretical framework presented in this project can further bridge the gap between the social in SES while widening the multiscale/multitemporal applications of FPE. The completed research results of this thesis project will be submitted to an academic journal, such as *Ambio* or *Ecology and Society*, that focuses on women agriculturalists and their experiences of remaining resilient in face of SES disruptions specific to the two counties.

While the anticipated article to be produced from this thesis project is mainly of interest to an academic audience, the fieldwork and results of this project strive to give voice and space to women within these communities to express their unique experiences of resilience and advocate for more inclusive or additional resources for women in agriculture. While the wider applications of this master's research project predominantly target the academic audience, the importance of research participants in the methodology produces opportunities to:

1. Allow space for women and women agriculturalists in Cimarron and Union Counties to express their unique experiences with SES disruptions and distress.

2. Compare the information produced at a national level, e.g., the USDA Agricultural Census reports, with the on-the-ground dynamics. National-level analyses of gender in agriculture and the gendered disparities are unevenly spread. Thus, analyses of how gendered SES resilience in agricultural communities manifests can inform site-specific solutions.
3. Increase attention to the opportunities and barriers of social groups in the area can warrant greater awareness of their effects on overall resilience for rural agricultural communities and SES systems.

In Chapter 2, I present the two main theoretical frameworks to investigate women in agriculture: SES frameworks and FPE. Further, I synthesize the two streams of thought by putting the frameworks in conversation with one another and identifying how each contributes to the other and to the problem.

CHAPTER II – LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Introduction

Many researchers have identified women agriculturalists as spearheads for fostering resilient agricultural productions by focusing on the longevity of operations and the people who rely on them (Sachs et al. 2016; Fertő and Bojnec 2024). Given the growing awareness of agriculture's role in environmental degradation and the subsequent loss of community livelihoods, there has been an increasing amount of research on how agricultural communities adapt to socioecological disruptions. SES resilience frameworks have been widely used to investigate the mutual and interdependent nature of human-environmental relationships. FPE also investigates human-environmental relationships while critically examining the power relations embedded within social systems. Both frameworks provide a necessary lens for understanding the women and their role in the resilience of agricultural communities.

This chapter first assesses the evolution of SES frameworks, including key concepts such as resilience and adaptive capacities, and highlights the nuances in their use in exploring gender. Next, the roots of FPE are presented, with a focus on the framework's applications to investigations of women. Finally, the chapter synthesizes the SES and FPE frameworks, defines how SES and FPE are understood in relation to agriculture for this project, and establishes the guiding coding framework used in the analysis.

1. Socioecological Systems (SES) Framework

Among the drivers of global environmental change, human activities such as mining, logging, urbanization, and globalization have been primary, with agriculture among them (Turner II et al. 1990; Surendran Nair et al. 2016; United Nations Climate Change n.d.). However,

understanding human-environment relationships in agriculture poses challenges for researchers because of the numerous, diverse actors and entities that influence both human and natural systems. In the age of the Anthropocene, humans continue to develop and modify their environment, making human-environment relationships increasingly more difficult to understand (Mann and Kump 2015). For instance, the globalization and industrialization of agriculture (Meyfroidt 2016), population pressure (Ellis and Ramankutty 2008), and complex human systems and structures that vary by location (Ravi et al. 2010) further trouble approaches to conceptualizing human-environment relationships. Thus, a systematic analytical approach to the multiscale and multitemporal dynamics involved in agricultural SES is necessary to identify the complex relationships between actors and/or with their environment (Turner II et al. 1990; Meyfroidt 2016).

SES frameworks are one approach when bridging the gap between social and ecological sciences, to understand vulnerability and resilience in SES (Ostrom 2009). A SES is a broad system comprised of human and natural subsystems that are “interdependent and coevolutionary,” where subsystems influence one another (Berkes 2017, 1). SES frameworks have been used for understanding vulnerability (Vallejo-Rojas, Ravera, and Rivera-Ferre 2016), supporting SES sustainability efforts (Ostrom 2009; McGinnis and Ostrom 2014), and importantly, resilience (Berkes and Folke 1998; Cutter et al. 2008; Cutter 2016; Berkes 2017). Further, the SES framework aims to “generate insights on how to interpret, respond to, and manage feedback from complex adaptive systems” (Colding and Barthel 2019, 1). Therefore, SES frameworks necessitate the convergence of the social and ecological sciences, which are crucial for such complex problems.

How SES frameworks are designed varies by scholar and focus. The first definition of SES was described by microbiologist B. L. Cherkasskii as:

“... consisting of two interacting subsystems: the biological (epidemiological ecosystem) and the social (social and economic conditions of life of the society) subsystems where the biological subsystem plays the role of the governed object and the social acts as the internal regulator of these interactions.” (Cherkasskii 1988, 321)

However, as a concept, SES was transformed into an analytical framework by Berkes and Folke (1998, 4) to match the dynamics between the components of human and environmental systems for "mutual socio-ecological resilience and improved performance." Further conceptualizations of SES follow a similar strain, in which scholars such as Ostrom (2009) sought to generalize language and terminology to bridge SES discourse across disciplines and regions. Environmental systems comprise nested ecosystems, such as regional ecosystems like grasslands with diverse herbaceous plants and associated animal communities. However, the social aspect of SES is more difficult to universally define.

Scholars such as Berkes and Folke (1998) and Ostrom (2009) tend to focus on institutions (i.e. governance) as the primary component of social systems, in which political and socioeconomic influences shape the structure and functioning of SES. However, the emphasis on the extent to which these variables affect social systems varies. For instance, Levin and colleagues (2013) emphasize the effects of political and economic incentives on individual actors, such as producers or decision makers, as important units of analysis in SES. Additionally, actors may have limited access or mobility because of socioeconomic forces governed by societal norms and social contracts (Levin et al. 2013). While SES dynamics vary by context, SES frameworks can provide a systematic way to examine how these systems and factors influence and interact with one another.

SES frameworks examine the overall functioning of SES and interactions between systems (Turner 2014). However, the SES framework recognized that a “one-size-fits-all” solution is

inadequate for addressing and investigating SES changes, as subsystems and their components vary by context (Ostrom 2009, 419). The SES framework has been adapted to include more nuanced variables for examining local- or place-specific conditions (Delgado-Serrano and Ramos 2015). Further, SES models have evolved to address complex interactions via temporal and spatial scales (Vadjunec et al. 2018), further examine complex ecological systems within SES (Vogt et al. 2015), social carbon management (Amin et al. 2023), non-human actors (Vadjunec and Sheehan 2010), and, more specifically, agri-food systems (Vallejo-Rojas, Ravera, and Rivera-Ferre 2016). SES resilience, a concept widely used in SES approaches, is one method for exploring SES. However, resilience needs to be further defined within the context of agriculture.

1.1 Resilience in SocioEcological Systems

While SES frameworks are valued for their flexibility and capacity for nuance, critical understandings of resilience are important for shaping these frameworks for research use (Bhalla et al. n.d.). Conceptualizing resilience in SES is difficult, and definitions have “a certain muddiness in the concept,” where definitions are unbound and often not a prescriptive solution (MacKinnon and Derickson 2013; Cretney 2014; Cutter 2016, 110; Mooney 2016). Thus, careful and explicit definitions of SES and resilience are key to studying and facilitating resilience.

The concept of resilience can take many forms depending on the context and scope of research (Alexander 2013). In its initial conceptualization, ecologist Holling (1973: 17) defined *resilience* as the “persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables, driving variables, and parameters, and still persist.” Holling (1973) distinguished resilience from stabilization, or the return of a system to equilibrium unchanged. Hence, resilience emphasizes adaptation and/or transformation (Walker et al. 2006). For this project, resilience is a “trait or a process” that social or ecological systems adopt,

fundamentally restructuring the overall SES (Robinson and Carson 2016, 115). Resilience can be enabled or inhibited by a system's or an actor's adaptive capacity. Adaptive capacity entails the ability of a person or system to overcome a disruption to an SES, either social or ecological (Cohen et al. 2016). Thus, SES frameworks generally aim to identify vulnerabilities, particularly during SES disruptions, to integrate adaptive mechanisms that facilitate resilience (Folke et al. 2010; Cutter 2016; Berkes 2017).

Considering that human and environmental systems are interdependent, global phenomena such as the greenhouse effect influence environmental systems' functioning and necessitate environmental systems to adapt to these changes (Turner II et al. 1990). Environmental systems can be understood through ecological rules grounded in ecology, physics, biology, chemistry, among others (Epstein et al. 2013). For instance, some resilient traits or processes in environmental systems can include the changes forests undergo in terrestrial succession over time to cope with changing environmental conditions and human activities or use (Vogt et al. 2015). Additionally, resilience strategies in environmental systems can "open up opportunities for ecosystem renewal and reorganization, development, and evolution" (Kasperson, Kasperson, and Turner 2009, 243). However, human use of natural resources can often exacerbate the adaptive capacities of environmental systems that vary on multiple scales (Gutman et al. 2004). Bridging the knowledge of the relationships between humans and the environment becomes crucial (Brannstrom and Vadjunec 2016).

Resilient traits or processes can look significantly different in social systems. Disaster risk reduction is one avenue in which resilience has gained more detailed common ground (Alexander 2013; Robinson and Carson 2016). When thinking about disaster risk reduction, some sociologists and geographers have conceptualized resilience in terms of "resilient communities," or how people

and human systems, through decision-making processes, respond, manage, and adapt to “external stresses and disturbances,” social, political, or economic, that are bolstered by social capital and community competency (Adger 2000, 347; Cutter et al. 2008; Alexander 2013; Cretney 2014). For SES resilience, the interconnected factors found in larger-scale processes, such as economic links to globalization and commodification of ecological resources, are emphasized when examining how SES are reconstituted and restructured (Adger et al. 2005; Cretney 2014).

Resilience processes respond to SES disruptions through adaptations that reorganize and (re) develop social structures, institutions, and livelihoods (Adger et al. 2005; Walker et al. 2006; Berkes 2017). Adaptation and adaptation processes fundamentally transform SES. For example, they can include the process of a community storing “lessons from disruptions and past experiences” and future abilities to adapt when future changes are uncertain (Cretney 2014, 630; Vadjunec et al. 2022). Adaptations and transformations, henceforth called resilience processes, vary greatly between climates, contexts, and between social and ecological systems. The ways in which social and ecological resilience converge are highly complex, where the “social” requires an in-depth examination into the sociocultural context of the SES (Cote and Nightingale 2012). Understanding resilience requires analyzing the differential susceptibility of social groups to identify and generalize resilience factors, processes, and components within agricultural SES (Cutter 2016; Straub, Vadjunec, and Fagin 2024). Here, I explore the use of SES resilience in agricultural communities.

1.2 SES Resilience in Agricultural Communities

It is important to examine SES resilience in agricultural economies, where agricultural communities depend on production and, in turn, the structure of community livelihoods is influenced by agriculture as a whole (Vadjunec and Sheehan 2010; Carrasco Galvan, Vadjunec,

and Fagin 2024). Since agriculture is a staple of human development in the age of the Anthropocene, research on agricultural SES resilience continues to be a key focus for understanding SES resilience at local to global scales. Agricultural SES are understood through 1) ecosystem processes that provide natural resources through regulation, production, habitat, and information, and 2) human subsystems or livelihood and production processes of knowledge, labor capacities, access to financial means of maintaining production, social capital within networks, institutions, and organizations (Carpenter et al. 2001; Vadjunec, Radel, and Turner II 2016; López et al. 2017).

In an agricultural context, resilience often takes form through the experimentation of “unconventional methods for land management” or production to stay afloat during SES disruptions, such as employing new technology, new farming techniques, or experimenting with fertilizer, livestock, and crops (Folke et al. 2010, 7). At its core, such experimentation is an adaptive learning process and a form of resilience. This instills new knowledge to cope with the most intense and pertinent SES disruption when navigating these changes and builds a personal and community toolkit to prepare for incoming disruptions, utilizing the disruption as an “opportunity for change” (Folke et al. 2010, 7). However, these changes and adaptations are enabled by social, economic, and political dynamics that extend beyond agricultural production management (López et al. 2017). Further, the sociocultural context and individual agency structure interactions and outcomes as well, where actors within social systems interact in varying ways, where “power and culture” also play a role in daily and long-term SES resilience (Folke et al. 2010; Cote and Nightingale 2012, 481; MacKinnon and Derickson 2013; Berkes 2017).

1.3 Gender-Blindness in SocioEcological Systems Resilience

Many critiques of SES resilience suggest the need for expanded social dynamics in SES that influence human agency, the power dynamics involved in social capital, as well as further identification of key social factors influencing SES structure and capabilities (Cote and Nightingale 2012; Cretney 2014; Sinclair et al. 2017). Communities are not homogeneous and cannot be prescribed an all-encompassing framework for SES resilience analysis (Ostrom 2009; Sinclair et al. 2017). For instance, institutions themselves are bound and structured by dominating power hierarchies that can limit mobility within them (Foucault 1976). Power in social structures can shape an agricultural community's decision-making processes, institutional access, or exclusionary power-knowledge relationships in production, institutions, and community (Nightingale 2023). Thus, social structures and humans are complex and do not exist inside a vacuum, requiring critical examinations of power in social structures, such as how gender fits within the structure of SES and resilience processes (MacKinnon and Derickson 2013).

Gender permeates the structure and functioning of SES. Responses to SES disruptions (Dah-gbeto and Villamor 2016) and social structures, like institutions, are inherently gendered (Butler 1990). Globally, women often lack “formal rights” and have a “disproportionate share of responsibilities” through informal rules and regulations mediated through cultural and social gender norms (Thomas-Slayter, Wangari, and Rocheleau 2013, 291), which can exacerbate their labor and responsibilities during SES disruptions (Carney and Elias 2006). Additionally, while gender can structure and organize communities, these gender structures also influence what resources are available to certain actors within SES networks.

Decision-making processes to foster resilience can be contingent on where actors are within their networks which is further determined by power relations within and between networks

(Cote and Nightingale 2012). For instance, in some cases, men find community cohesion through their agricultural networks, whereas women seek community institutions or organizations, such as religious organizations, to be the binding core of community livelihoods (Campbell 2013; Cohen et al. 2016). Differences between people often lead to varying abilities to engage with resources—social or ecological—thereby making in-depth analysis of intersectional subjectivities affecting relational networks in SES crucial (Aregu et al. 2016). In particular, the social system in SES is highlighted as needing further transdisciplinary work to capture the complex intersectional roles of human systems within SES (Cote and Nightingale 2012; MacKinnon and Derickson 2013; Cretney 2014). Incorporating a situated and intersectional framework to examine the influence of social differentiation within SES, such as FPE, presents an opportunity to enhance and enrich resilience theory that is cognizant of the role of unequal positionings within SES.

2. Integrating Feminist Political Ecology (FPE) and SocioEcological Systems (SES)

Cultural ecology, and later political ecology, made necessary advancements in the 1930s to 1950s in studying human-environment relationships as non-mutually exclusive, placing greater emphasis on the human systems that control, manage, and influence human interactions with the environment (Rappaport 1990; Robbins 2011; Vayda and Rappaport 2014). From cultural ecology, concepts of cultural landscapes (Sauer 1925; Potthoff 2013), culture as an “adaptive mechanism” (White 1943; Sutton and Anderson 2010, 97; Steward 2014, 12), and systems thinking (Rappaport 1990; Watts and Peet 2004) paved for new ways of thinking about human-environment relationships that included sociocultural variables and drivers. These concepts became foundational for political ecology's emergence, suggesting that political and economic environments critically impact SES structure and operations (Robbins 2011).

While SES frameworks incorporate broader, global economic influences into decision-making processes (Ostrom 2009; McGinnis and Ostrom 2014), place-based sociocultural contexts operate in tandem with larger global schemes (Turner 2014; Rocheleau 2015). Political ecology opened new transdisciplinary opportunities when studying SES by incorporating feminist disciplines such as ecofeminism (Escobar 1996) and poststructuralist theories (Rocheleau 2015), which formulated holistic framings of SES focused on identity-based power relations, such as FPE. Drawing from ecofeminism, the FPE framework arose to incorporate marginalized voices from dominating reductionist regimes as an ethical necessity to create a “science and knowledge that nurtures, rather than violates, nature’s sustainable systems” (Shiva 2014, 34).

The FPE framework was designed to examine human environmental relationships, such as SES, with a critical lens recognizing power dynamics determined by social differences between individuals, such as gender, at play within SES (Thomas-Slayter, Wangari, and Rocheleau 2013). With a structural basis from political ecology (Robbins 2011) and feminist theory (Rocheleau, Thomas-Slayter, and Wangari 2013), FPE prioritizes access, use, knowledge, roles, and responsibilities of individuals or entities as crucial variables for analyzing human-environment relationships (Rocheleau, Thomas-Slayter, and Wangari 2013, 9–13).

FPE emerged from several scholars' critiques of traditional expectations and ways of doing environmental science that prioritized the on-ground dynamics of current or past SES (Haraway 1985). FPE has strong foundations from other schools of scholarship of feminism, environmentalism, and political ecology, but expands on the consequences of the “social interpretation of biology and social constructs of gender” that are subject to change (Rocheleau, Thomas-Slayter, and Wangari 2013, 3). The FPE framework, created by Rocheleau and colleagues (1996), expanded previous political ecologies and environmental sciences that lacked a holistic

framework for examining the sociocultural drivers in environmental development. FPE is unique because it incorporates principles of political ecology while also recognizing the social constructs of gender and its critical role in shaping varying spatial, environmental, cultural, and intersectional characteristics. Gender can materialize in formal and informal politics that reproduce “regulated cultural fictions” and should be integrated into discussions, both academic and public, on environmental and ecological changes for more robust and inclusive analyses (Butler 1988, 522–523; Rocheleau, Thomas-Slayter, and Wangari 2013, 4). Therefore, FPE scholars argue that social differentiation and power shape experiences with one’s environment can limit or enable interactions within SES (Rocheleau, Thomas-Slayter, and Wangari 2013; Rocheleau 2015). Like other feminist disciplines, FPE focuses on the “broader issues of social justice and decolonizing gender” (Sultana 2021, 158).

The FPE framework wove political ecology with feminist theories to recognize the body as an agent or actor, that is influenced by its sociocultural context comprised of political, cultural, social, and power dynamics (Haraway 1985, 1988). FPE draws and collaborates with those who “arose on the street, in countless women’s groups” made up of “housewives, secretaries, students, and few social scientists” who “jointly, as women” have experienced the impacts of a gendered social system (Mies 2014, 36). While much literature using FPE focuses on gender as a crucial sociocultural variable shaping human-environment relationships, FPE targets power hierarchies and the intersections of social differentiation tied to race, ethnicity, class, or caste that position individuals within SES (Rocheleau, Thomas-Slayter, and Wangari 2013).

FPE complements transdisciplinary work on human-environment relationships, such as SES, that target historical and current sociocultural factors to understand who benefits and who bears the cost of SES changes. For instance, FPE has been used in Black geographies to unveil

Black experiences with their environment, which exposed the restrictive social structures, like institutions or social norms, inhibiting participation in the environment (Finney 2014). FPE has also been used in studies on post-colonial intersectionality and critical race scholarship, where inequities perpetuated through the power of racialization in SES become visible and linked to historical and current reproductions of privilege (Mollett and Faria 2013; Mollet 2017). While not wanting to reproduce the same subjectivities that marginalize social groups, women continue to be disadvantaged necessitating continued work examining gender in SES research. FPE presents an opportunity to fill this gap (Bauhardt 2019). However, FPE often lacks the broad-scale implications that SES can produce relevant for a wider variety of audiences, particularly decision-makers and international agendas. Further, SES approaches are more robust for grappling with the embedded multiscale/temporal perspectives of interactions between social and environmental systems. In what follows, the SES framework is combined with the FPE framework to showcase how the two approaches complement one another to identify the gender-specific interactions in SES centered on women.

2.1 FPE Women and Nature

Gender's meaning and structure vary based on location and context. As defined by Lau (2020), gender refers to: "...the sociocultural constructions of masculinity and femininity that shape people's opportunities, experiences, social practices, and relations in day-to-day life" (1590). Examining gender in each context requires questioning what makes one gender distinct from another, which extends beyond the dualistic perspectives presented by biological determinism (Haraway 1985; Lau 2020). The contextual constructions of gender are sustained on temporal and spatial scales that affect an individual's interactions with their environment and, in turn, vary outside of traditional understandings of gendered binaries (Lau 2020; Sultana 2021).

The FPE framework emphasizes contextual elements such as gendered spatial characteristics, power relations that shape resource systems, and the actors' enmeshment in an interconnected network.

When understanding SES as interdependent systems, social differences in one space can influence other spaces within these systems or networks. Understanding the intersectional subjectivities of women limiting mobility in SES can unveil how changes in SES can (re)produce these subjectivities (Rocheleau, Thomas-Slayter, and Wangari 2013). For instance, women are often misrepresented or excluded from discussions of SES where their agricultural knowledge or experiences are devalued (Campbell 2013; Adams, Juran, and Ajibade 2018). Even when women's participation in agricultural decision-making is permitted, they tend to be excluded from decision-making and policies regarding natural systems that directly affect their livelihoods (Campbell 2013; Seager 2013; Leder 2022). Furthermore, formal structures such as policies do not translate to informal spaces where social norms or cultural values play out differently (Radel 2012; Campbell 2013). Even when access to natural resources or formal spaces is available, resources can be reassessed within households, thus making decisions on natural systems both environmental and gendered (Radel 2012). Informal spaces (e.g., intrahousehold or social networks) are often underrepresented as influential within SES frameworks.

In informal spaces, such as one's intrahousehold, women, as "reproducers" and caretakers, are uniquely positioned in human-environment relationships in which needs are centered on sustainable solutions and actions that preserve the "fundamental necessities of daily life" (Rocheleau, Thomas-Slayter, and Wangari 2013, 8). These unique positions within SES can create gendered knowledge systems that are often excluded from discussions of SES disruptions, despite offering crucial insights into agricultural community livelihoods (Carney and Elias 2006; Roth

2009). Additionally, due to restrictive gender roles, women are often limited to a few spaces within their communities deemed acceptable for women's participation. For example, across many FPE studies, women have few avenues for community participation or environmental activism, such as community-based organizations, religious institutions, or autonomy within the household (Campbell 2013; Seager 2013). Even with some autonomy, sociocultural drivers and social norms can discourage participation in environmental decision-making, skewing outcomes to serve select social groups while continuing to marginalize others (Radel 2012; Campbell 2013; Finney 2014). In the following section, I outline how feminist political ecology converges with resilience theory to explore how incorporating intersectional subjectivities complements resilience theories.

3. SocioEcological Resilience and Feminist Political Ecology

Both SES and FPE examine human and environmental systems as interdependent. Both examine how SES change and adapt to SES-related disruptions, such as coastal communities adapting to the restructured SES following coastal disasters (Adger et al. 2005), and how agroecosystems evolve with changing local and global dynamics (Vallejo-Rojas, Ravera, and Rivera-Ferre 2016). FPE often takes a more qualitative approach to analyzing adaptation and resilience, whereas SES resilience theorists predominantly examine the persistence of SES through mixed-methods approaches (Turner 2014). Further, SES resilience theories often add an important material engagement and understanding of environmental changes, as well as complex human-environmental interactions and feedbacks across time and space (Adger et al. 2005; Cretney 2014). FPE resilience scholars investigate the unequal distribution of adaptive capacities from intersectional subjectivities within SES (Aregu et al. 2016; Cohen et al. 2016).

Each set of literature complements the other. SES resilience employs systems-thinking approaches that generalize human-environmental systems by explicitly identifying the unique

structures and components of social and ecological systems, and employs multiscale perspectives, incorporating influences from local to global scales. Additionally, SES resilience has wide applications among academic disciplines and to policy/decision makers (Alexander 2013; UN n.d.). Incorporating FPE into SES resilience studies allows for in-depth investigations of people operating in social systems within SES, but does not have the same wide applications to decision-making spaces as SES. However, FPE's targeted investigations of the intersectional experiences within SES are a necessary component.

FPE scholars have been recognized as central figures in resilience thinking, focusing on people's vulnerabilities during SES changes and on "power in action in contexts of resilience" (Garcia et al. 2022, 6). Resilience is inherently gendered, as individuals are "enrolled in particular kinds of SES" often based on social characteristics, such as gender, that influence their capacities, resources, and experiences with resilience (Cote and Nightingale 2012, 485). For this project, SES and FPE have been synthesized to identify key SES components where gender plays a role. The SES-FPE components are as follows: environment, economic, production, institutional, community, and intrahousehold. In what follows, SES resilience and themes of FPE are synthesized and put in conversation with one another by highlighting how SES components are influenced by gender.

3.1 Environment

As a key component of SES, SES interactions with one's environment can be enabled or limited by gender. When considering agriculture, the environment encompasses land ownership, crop availability, and environmental and climate conditions that can lead to unique experiences based on past interactions or current roles and responsibilities, driving interactions with one's environment (Adger et al. 2005; Rocheleau, Thomas-Slayter, and Wangari 2013). With gendered

roles and responsibilities, women often create gendered knowledge systems that understand natural resources differently from male agriculturalists. In many cases, FPE scholars find that women's relationship with natural resources is oriented towards their individual, intrahousehold, and community well-being (Seager 2013; Nyantakyi-Frimpong 2021; Leder 2022). Additionally, rights to land can be determined by gender, structured by current social and cultural norms, or structured based on historical gender norms that leave a lasting impact.

Many FPE scholars find men often have more legal opportunities and access to natural resources than their counterparts (Carney and Elias 2006; Radel 2012; Campbell 2013). Informal structures such as gender norms can further reproduce gendered binaries for access to the environment based on informal "systems of social relations that encompass property rights, rules of access, inheritance and use" (Roth 2009, 214; Leder 2022). Interactions with the environment, structured by gender norms, can be influenced by gendered roles and responsibilities, or by experiences with the environment that shape those interactions. For example, one's roles and responsibilities and gendered knowledge of resource systems, often delineated by gender, may affect where and how environmental resources are extracted or engaged with, leading to gendered interactions with the environment (Roth 2009; Aregu et al. 2016).

Responses to environmental changes can be gendered and people cope with disruptions differently. Based on the social and environmental resources available, gender can play a role in how and in what ways people are able to respond to environmental changes (Dah-gbeto and Villamor 2016). In agricultural communities, the environment and economy are deeply intertwined, where the environment provides ecosystem services as well as imposing variable conditions that can enable or inhibit the utilization of these natural resources (Anderies, Janssen, and Ostrom 2004).

3.2 Economic

Economic components of SES can vary throughout space and time. Economic influences operate on local, regional, national, and global scales. The multiscale influences in economics necessitate ample consideration of SES across these various scales, as well as the interactions among them (Anderies et al. 2013). On a regional scale, available markets and environmental resources can affect individuals' interactions with their SES, determining which resources are utilized and which resources/labor are prioritized over others (Anderies, Janssen, and Ostrom 2004). In some cases, large-scale economic markets may not be available to women where their labor is discredited or not considered a core or primary piece of production (Campbell 2013). For instance, women and women's labor are often perceived as synonymous with natural resources, or as a labor source to be extracted and exploited for economic gain and are thus undervalued and undermined (Shiva 2014; Rocheleau 2015). Even in cases where women seek other economic opportunities, the capital or resources accrued outside the home are reassessed within intrahousehold environments (Radel 2012).

Global-scale influences, or globalization, on agricultural products can exacerbate women's labor, as women maintain key caretaker roles within households while continuing agricultural labor to meet global demands, with limited economic benefits (Carney and Elias 2006; Wichterich 2015). Global economies can influence local and regional scale SES (Chapin III et al. 2015). Gender power relations and structures in SES influence economic resources, where disadvantaged social groups are on unequal footing, which makes coping with SES disruptions more difficult. Regional- and local-scale factors affecting the economic facets of SES shape its structure, which is further influenced by gender norms that are enacted at a local scale between individuals into large-scale processes. Thus, large-scale components, such as economics, shape how gender groups

engage with their environment and influence components such as production, as the two are enmeshed in agricultural SES.

3.3 Production

Production is a key component of agricultural SES, influenced by other components and compounded by gendered social structures. The environment and economy are two key SES components that can influence agricultural production systems (Adger 2000; Delgado-Serrano and Ramos 2015). When considering agricultural production, women's participation in agricultural production can be restricted by their male counterparts, aiming to maintain patriarchal social stability. For example, among Xapuri rubber tapping communities in Brazil, when first granted access to workers' unions or legal opportunities, priority has historically been given to men, often discouraging women's participation (Campbell 2013). Production can also become a gendered operation, where roles and responsibilities or participation in production can be structured by one's gender identity, cultivated by historical and current gender norms.

Some agricultural labor may be seen as a uniquely feminine production where techniques and knowledge of the environmental resources are circulated and shared between female agriculturalists (Carney 2004; Carney and Elias 2006). In the case of African shea butter, women laborers headed production from seed selection to the extraction processes. Despite global demand for shea butter surging, new technologies to make African shea production more efficient, particularly mechanized shea extraction, were deemed unsuitable for extracting the most value from seeds; thus, laborers opted for the traditional extraction methods used by women agriculturalists (Carney and Elias 2006).

Furthermore, the gendered knowledge systems of women agriculturalists often prioritize methods and production practices that serve their families' interests and the longevity of their production. For instance, women ranchers in the southwestern United States reported taking “less material benefit for themselves in terms of profit, standard of living, or nutrition, to support some aspect of ranch sustainability, including the condition of livestock, rangeland, and/or ranch infrastructure,” and taking other supplemental opportunities for income to fill financial gaps in their intrahousehold (Wilmer and Fernández-Giménez 2016, S366). An example of this sacrifice of relinquishing material benefits for the operation can include lowering grocery expenses or not updating equipment, vehicles, or furnishings (Wilmer and Fernández-Giménez 2016). However, when these agricultural roles and responsibilities shift, such as the consequences of policy adjustments or out of necessity during SES disruptions, the accumulated knowledge developed by men surrounding agricultural labor becomes harder to transfer.

Much of this agricultural knowledge is acquired through experience, and other resources, such as educational materials or social networks, may be unavailable to female agriculturalists due to historically structured gender norms that often prioritize men. For example, a policy shift may expand entry points to land access and rights. However, access to these resources may be hindered by the continued lack of access to informal spaces where decision-making amongst community members is structured by social norms that may restrict participation (Cohen et al. 2016). Even on local scales, where men and women work alongside each other in agricultural production, women's labor is often undermined through sociocultural norms (Aregu et al. 2016; Adams, Juran, and Ajibade 2018). Institutions are another SES component that interacts with other key SES components, which are often structured by gender.

3.4 Institutions

Institutions are another component of SES influencing the effects and operationalization of SES changes. Institutions exist as both formal institutions, such as education, governance, and economic policies and regulations over resources (Anderies, Janssen, and Ostrom 2004; Blaikie and Brookfield 2015), and informal institutions, such as gender norms or cultural values structuring human behavior (Butler 1988; Martin 2004) that can both undergo transformative processes to remain resilient during disruptions (Berkes 2017). Institutions can govern the use and structure of both social and environmental systems, making them an integral and inseparable component of SES (Berkes 2017). Participation in governance and decision-making processes is another avenue leading to resilient practices and strategies of natural resources that include women, where other vulnerable social groups (e.g., children, the elderly, and the disabled) may also benefit (Adams, Juran, and Ajibade 2018; Ojeda et al. 2022). When considering the relationships between women and governance, “historically ingrained power relations, micro-politics, and gender dynamics at different scales” can hinder women’s participation in decision-making and involvement in governance (Adams, Juran, and Ajibade 2018, 134).

Women’s roles and responsibilities with natural resources are often not represented in decision-making or management positions. Thus, decisions on natural resources often impact communities and individuals unevenly and “serve to shape subjectivities” (Nightingale 2023, 151). When decisions are made to promote sustainable agricultural practices, the benefits are often unevenly distributed to community social groups, where access to ecological and social resources is limited due to gendered power hierarchies that can further be influenced by race, class, or ethnicity (Aregu et al. 2016). Therefore, women often engage with agriculture and community through other means, such as religious institutions, community-based organizations, Extension

groups, grassroots groups, or uniquely feminine resilient agricultural practices (Carney 2004; Radel 2012; Campbell 2013; Seager 2013; Hinsdale et al. 2026). However, while women's participation has been linked to more resilient communities, it can be limited by restrictive gendered responsibilities, lack of access to educational opportunities, or sociocultural influences discouraging women's participation (Adams, Juran, and Ajibade 2018; Nightingale 2023). These interactions with one's institutional subsystem can create gendered experiences and knowledge that may or may not be represented in formal politics, but they show how women in agricultural communities cope with SES changes despite restrictive sociocultural contexts.

3.5 Community

Community is another key subsystem influencing SES interactions that can include community social networks (Colston, Vadjunec, and Fagin 2019; Straub, Vadjunec, and Fagin 2024), community groups (Chaskin 2008; Campbell 2013), and community action and initiatives (Cutter et al. 2008). Community also includes the identity and shared contextual norms that cultivate a sense of belonging and shared interest (Chaskin 2008; Colston, Vadjunec, and Fagin 2019). Where formal access to decision-making spaces and policy may be limited, community spaces and groups offer an alternative means to manage and interact with SES resources. For instance, many studies find that women are key community leaders and grassroots organizers for sustainable goals by creating spaces and structures that support women's participation (Campbell 2013; Seager 2013). Thus, in many communities, women are found to be fundamental in SES resilience.

During SES disruptions, women's labor in these spaces can often be exacerbated and not properly represented in SES frameworks (Adams, Juran, and Ajibade 2018; Leder 2022). However, community subsystems can be key to coping with SES disruptions. During SES

disruptions, particularly slow-onset disasters such as drought, there are opportunities to adapt to these changes while the event is occurring. This can include shared skills among individuals and actors, shared management goals of environmental resources, or community initiatives to collectively overcome slow-onset disasters (Cutter et al. 2008). Community subsystems can also be influenced by large-scale economic conditions, particularly in agricultural communities, where economic markets influence community livelihoods. The previous SES components subsequently trickle down to smaller scales within intrahouseholds, while also affecting SES at larger scales.

3.6 Intrahousehold

Intrahousehold systems are the distribution and production systems for both social and environmental resources within a household (Radel 2012). It should be noted that the definitions of "intrahousehold" and "household" are distinct. Household refers to the household as a single unit, with shared goals and resources (Casimir and Tobi 2011). The intrahousehold, however, introduces an additional decision-making space for managing environmental, economic, institutional, and community resources with its own production systems and internal sociocultural structure that can vary throughout space and time (Wisner et al. 2004; Radel 2012). Intrahousehold production and roles & responsibilities can include maintaining clean household environments, managing household-level food systems, or managing household economies. Intrahousehold production can be determined by shared norms within the community, which delineate individuals' roles and responsibilities and may enable or limit SES interactions. For instance, access to environmental resources granted through policy can influence what resources are accessed and utilized in intrahouseholds (Radel 2012; Aregu et al. 2016). Within intrahouseholds, however, gendered power dynamics can influence decision-making capacities and access to resources. Resources obtained outside of the household can be reassessed within intrahouseholds as the

decision-making process is its own SES component with complex dynamics and norms, thus making it a critical component of SES (Radel 2012).

4. Conclusion: Convergence of SES Resilience and FPE

Understanding resilience through the SES-FPE components of environment, economic, production, institutional, community, and intrahousehold enables holistic framings of resilience for social groups within SES that focus on uneven access and control. HDGEC community and SES frameworks are attentive to agricultural developments as key drivers in SES changes. Additionally, SES frameworks have wide applications in and outside of academia, particularly in governing spaces. However, the SES framework alone often fails to capture the multidimensional and multiscale context of social differentiation that permeates decision-making processes within SES (Cote and Nightingale 2012). FPE helps fill this gap in SES frameworks by focusing on the interplay of social differentiation and power that influence SES networks. Incorporating both allows for grappling with more fluid boundaries between multiple scales, such as the influence of large-scale environmental conditions on intrahousehold dynamics and vice versa.

In agricultural communities in the Southern Great Plains, the impacts of social differentiation on adaptive capacities for resilience during SES disruptions are critical. Together, the SES resilience framework focuses on the adaptive capacities of SES components, while FPE critically examines the sociocultural drivers of inequity and exclusion within SES, thereby advancing a holistic theoretical framework that incorporates power dynamics. Furthermore, intersectional analyses within FPE frameworks identify areas for consideration in future sustainable development policy and incorporate voices that may otherwise go unheard.

Converging SES and FPE frameworks place further emphasis on the sociocultural context of SES that can enable or inhibit social groups' capacity to adapt to SES changes. While the inclusion of women within SES resilience research does not necessarily dismantle or dissolve sociocultural power hierarchies in SES, it does uncover how, why, and for whom people respond to SES disruptions (Leder 2022). This project identifies key components: the environment, production, institutions, community, economics, and intrahouseholds as important for SES resilience. Further, the addition of the FPE lens enables a more nuanced investigation of the complex relationship between women and resilience. Investigating women agriculturalists and the SES in the southwestern United States, remains pertinent and worthy of analysis (Wilmer and Fernández-Giménez 2016). This theoretical framework calls for an in-depth examination of the micro-scale politics and interactions that influence broader SES schemes, with attention to global-scale influences alongside local- and individual-scale contexts.

CHAPTER III – METHODOLOGY

Introduction

Understanding the complexities of women in agriculture and socioecological resilience (SES) is of local, national, and global importance and attention (USDA NASS 2022b; United Nations Climate Change n.d.). Contributing to resilience discourse with further emphasis on the implications of gender in agriculture is of interest to decision-makers, policymakers, and academics when contributing to efforts to foster resilience in agricultural communities (Cretney 2014; Cutter 2016). Additionally, gendered experiences of resilience necessitate an in-depth understanding of the on-the-ground dynamics.

This project uses a mixed-methods approach to identify the relationship between women in agricultural communities and SES resilience in Cimarron and Union County (see Fig. 1). Socioecological systems resilience frameworks examine the broader human and environmental systems, while feminist political ecology uses an intimate lens to explore system-wide interactions. Oral histories from Dust Bowl survivors, their offspring, and even their offspring's offspring, alongside supplementary key informant interviews, are a central piece of this project, providing in-depth views and perceptions of women and agriculture on the ground. These qualitative methodologies are triangulated with results from USDA Agricultural Census reports from 1978 to the present.

Table 3: Project research questions, methods, and data sources.

RESEARCH QUESTION	METHODS & DATA
<i>Q1) How has women's participation in agriculture changed from 1978 to the present?</i>	USDA Agricultural Census Data (1978 to 2022) • First report of women in Agricultural Census data in 1978 • Producer information
<i>Q2) How do women in rural communities participate in agriculture and contribute to SES resilience?</i> <i>a. What are women's opportunities and barriers for participating in agriculture?</i> <i>b. How/has women's participation in agriculture and SES resilience changed over time?</i> <i>c. In what ways do women impact overall SES resilience in agricultural communities?</i>	Oral histories of Dust Bowl survivors & their offspring • Collected by Vadjunec and colleagues (2015-2016) as part of a previous grant/project • 57 oral histories from both counties coded with the SES-FPE framework • 20 women from Union County • 17 women from Cimarron County Follow-up key informant interviews • Supplementary & update to oral histories • 30 (15 interviews from each county) • Coded with SES-FPE framework
<i>Q3) What are the broader implications for agricultural policy and SES resilience?</i>	Follow-up key informant interviews with 15 per county (n= 30)

Q1 is addressed through a temporal analysis of Agricultural Census Bureau data from 1978 to 2022, focusing on the formal representation of women in agriculture through producer counts by gender over time. This producer's information will be linked to narratives of production as seen in the oral histories and key informant interviews. Previously conducted oral histories and more recent key informant interviews are used to address Q2, illustrating how women in rural communities have historically and currently participated in agriculture and contributed to SES resilience. These oral histories provide crucial experiences of previous droughts while also documenting the changing gender norms and roles related to hardship in the study area. Further,

key informant interviews help answer Q3 regarding the broader implications of agricultural policy and SES resilience in today's context. These three core research questions serve to answer how gendered social dynamics influence the capacities to adapt and cultivate SES resilience in times of distress.

3.1 Producer Information (Q1)

Collecting and analyzing producer counts over time was an introductory piece to understanding the state of women in agriculture in the two counties. The USDA Census of Agriculture provides documentation of the state of agricultural production in the nation at five-year intervals. The Agricultural Census reports began in 1840, initially undertaken by the U.S. Department of Commerce, Bureau of the Census, until 1997. In 1997, the responsibility was transferred to the USDA's National Agricultural Statistics Service (USDA NASS n.d.). These reports continue to document important information about the state of agriculture in the country, including revenue, agricultural land area, operating types, producer information, and other statistics. These reports are crucial for assessing the national and formal perspectives of women in agriculture.

Over time, the documentation processes have changed, including changes in terminology, who is included in the Agricultural Census Reports, and the further diversification of production characteristics. All reports on farm characteristics and information rely on USDA surveys administered via self-report, meaning that per-farm information is provided by head-of-household producers. Women, for instance, were not recorded as producers until 1978 (Pilgeram et al. 2020). Additionally, "operators" were used to describe individuals who maintained agricultural production until 2002, when "producer" replaced "operator." An operator was described by the U.S. Census Bureau in the reports from 1978 to 1997 as "a person who operates a farm, either

doing work or making day-to-day decisions about such things as planting, harvesting, feeding, and marketing” as an owner, hired manager, tenant, renter, or sharecropper (USDA NASS 1997a, 1997b, A9). From 2002 to 2022, the USDA Agricultural Census reports define producers as (USDA NASS 2022a, B16):

“a person who is involved in making decisions for the farm operation. Decisions may include decisions about such things as planting, harvesting, livestock management, and marketing. The producer may be the owner, a member of the owner’s household, a hired manager, a tenant, a renter, or a sharecropper. If a person rents land to others or has land worked on shares by others, he/she is considered the producer only of the land which is retained for his/her own operation.”

This change was also accompanied by the possibility of listing multiple producers per farm, rather than a single principal producer overseeing production. From 1978 to 1997, “for census purposes, the number of operators is customarily the same as the number of farms” (USDA NASS 1997b, A9, 1997a). From 2002 to 2022, reports ask for producers per farm to record how many producers (up to four producers) that contribute to daily operations as heads of household or not. Additionally, for data collection purposes, surveys require a principal producer to be self-defined (USDA NASS 2022d, 2022c). Thus, for the purposes of this study, producers are considered those who actively contribute to agricultural operations on family-owned operations, as hired hands, or in for-profit agriculture, including resource management, operational decision-making, financial planning, and agricultural market participation.

While the focus is on female producers, for context/comparison, counts of both female and male producers were recorded in Excel from the USDA Agricultural Census reports from 1978 to 2022. From 1978 to 1997, only one producer per farm, or the principal producer, was recorded. Therefore, from 1978 to 1997, female and male principal producers or heads of household’s counts were recorded, and from 2002 to 2022, total female and male producer counts, including farms with 1 through 5+ producers, were collected. This method was preferred to maintain consistency

in producer information despite changes in report documentation and to track the total formal representation of both sexes in Agricultural Census reports rather than just primary producers. To complement producer counts, land area (hectares) per female or male operator was collected to compare the prevalence of agriculture across counties and to examine land access among producers. To interpret this data, the producer counts will be visualized in RStudio using a simple time series plot. Producer information from each county is combined by sex to show trends in female versus male producers over time. This time-series plot is compared with oral histories and key informant interviews to examine the relationship between Agricultural Census reports and on-the-ground perspectives of women in agriculture.

3.2 Oral Histories (Q2)

To understand the study area's community livelihoods and agriculture, oral histories are crucial. The chair of this master's thesis project, Dr. Jacqueline Vadjunec, collected oral histories, funded by an NSF grant (CMMI-1266381, Vadjunec, Fagin & Phillips), from Dust Bowl survivors, their offspring, and even their offspring's offspring to understand SES resilience and slow-onset disaster. These oral histories were transcribed, returned to participants, edited again by (as needed), and then donated to the Oklahoma Oral History Research Program (OOHRP) for future use (Vadjunec et al. 2021, 2022). In addition to investigating SES resilience during drought, the oral histories capture individual lived experiences, the roles of community, identity, and land & water resource management in the study area, and perceptions of environmental change. Oral histories were conducted in 2015 and 2016 (Vadjunec and Sheehan 2010; Vadjunec et al. 2021, 2022) in Cimarron County, OK and Union County, NM. Participants included agriculturalists, community leaders, educators, public relations officials, entrepreneurs, and government employees. Given the topic, this thesis draws on thirty-seven oral histories with (all) women. The age ranged from 30 to

96 years, and the average age of participants was ~75 years old. The transcriptions totaled 593 pages. Crucial work for this thesis was conducted as a GRA for Dr. Vadjunec on a separate project assessing gendered differences between both men and women in overcoming socioecological disruptions and slow-onset disasters (Hinsdale et al. 2026).

Questions in the oral histories focused on identity, perceptions, community perspectives, land-use management, land tenure policy, and topics such as water management, irrigation, drought, climate change, and technological adaptations. These questions probe for experiences from a long time frame, from the early 1900s to the time the oral histories were conducted. The oral histories capture the experiences and changes associated with several recurrent droughts in the area, focusing on individual and community experiences in adapting to these changes.

The oral histories were coded in NVivo (14.1) using a deductive approach with an FPE framework designed by Dr. Vadjunec and me, informed by the SES-FPE framework (Hinsdale et al. 2026). The FPE framework, designed for Dr. Vadjunec's related project, encompasses four main themes: access, participation, roles & responsibilities, and gendered knowledge. Additionally, subcodes were included within each of the four main SES-FPE themes that are the heart of this project: environment, production, institutional, economic, and community. As explained in the theoretical framework of this proposal, the subcodes encompass many facets of SES that are central to this thesis project. The first paper produced out of the GRA work for Dr. Vadjunec focuses on the four main FPE themes mentioned above, while this project focuses on the subthemes or SES components previously listed. Next, I discuss the process for identifying and creating the FPE-SES frameworks with Dr. Vadjunec for the GRA work and this project.

The SES-FPE components identified facets of social groups with potential power dynamics that are important to these overarching systems (McGinnis and Ostrom 2014; Aregu et al. 2016;

Ravera et al. 2016; Berkes 2017; Garcia et al. 2022). They are key units of analysis for understanding how varying genders navigate SES (Rocheleau, Thomas-Slayter, and Wangari 2013, 9–13). While the manuscript for the four main themes has already been submitted for publication, my work focuses on analyzing the additional coded subthemes that outline the factors influenced by gender within SES. Additionally, these subthemes will identify the crucial actors and entities specific to the SES of agricultural communities.

When coding the oral histories, input and discussions were conducted weekly over the course of a year, in 10-week intervals, between Dr. Vadjunec and me to ensure intercoder reliability and make necessary adjustments based on these conversations. In addition to the theoretically-driven “forced” SES-FPE codes, we used an iterative grounded theory approach that allowed emergent codes to arise from the oral histories as needed (Cope 2021). As part of my work as a GRA for Dr. Vadjunec, the coded oral histories were used to generate descriptive statistics on the distribution of references across the main themes and subthemes. Excerpts from the oral histories were drawn to further explain emergent themes and contextualize the conversation in the words of the participant. Oral histories are presented anonymously by the county to protect participants' privacy, given the topic and context. Additionally, the database was coded to include the variables used in this study. For each of the intersectional SES-FPE components, i.e., environment, economics, production, institutions, community, and intrahousehold, counts and percentages of total references were derived to show the ratios in which each theme was discussed by gender and county. Additionally, emergent themes are drawn from each SES-FPE code to highlight conversation topics within that code. These themes address how, where, and why resilience strategies occur and fit within the FPE themes, thereby creating a method for investigating how gender fits within SES (LeCompte and Schensul 2010). The oral histories are

used to answer question 2, providing context, documenting women's experiences during current and past droughts, and examining the relationships among women, agriculture, and community livelihoods. The oral histories are a core component of this project, with key informant interviews serving as a supplementary component to view the current landscape of women in agriculture.

3.3 Key Informant Interviews (Q2, Q3)

The key informant interviews are shaped by the oral histories. For this project and future papers, the interview guide used for the oral histories was adapted to incorporate more targeted questions about women in agriculture (see Appendix I, section "Gender and Resilience"). The adapted interview guide included targeted questions about women in agriculture while recognizing that responses to any question inherently reflect a gendered experience. While the oral histories aimed to understand slow-onset disasters, the key informant interviews focused on mediating conversations about SES resilience and women.

In each county, 15 key informant interviews were conducted with a variety of participants during the summer of 2025, for a total of 30. The committee chair, Dr. Vadjunec, has established social capital in the area over several decades. Collectively, across counties, nearly 3 weeks of fieldwork were conducted. Initial leads for participants were provided by Dr. Vadjunec, starting with individuals and relationships established in previous years and projects. Some participants were also interviewed for the oral histories. These initial contacts provided by Dr. Vadjunec served as an entry point to find new participants through a snowball sampling method (Stratford and Bradshaw 2021). Some participants had no relationship to previous projects and were instead identified for their important roles in communities, informed by key actors in the FPE and SES literature. Incorporating past and new participants allows for comparisons between qualitative datasets, the investigation of new perspectives, and intimate engagement with community

experiences. Both the established and new connections provided a contemporary view, informed by the experiences expressed in the oral histories.

All 30 interviews are analyzed together as a single dataset to align with the analysis of the oral histories, while also recognizing that the livelihoods and environments are relatively similar across counties. Participants included agriculturalists, community leaders, financial professionals, educators, and government employees. The interview guide for the key informant interviews (see Appendix I) is an adapted interview guide used for the oral histories and the *Agroecosystem Resilience In times of Drought (ARID)* project for which Dr. Vadjunec served as the research lead. Highlighted questions are those that were focused on in the interviews, but other questions in the interview guide were used as necessary based on the participant's background and experience (see Appendix I).

These interview questions were used and incorporated to build on previous work in the area and to adhere to IRB standards. IRB approval was obtained through Oklahoma State University, and the University of Oklahoma approved the deferral of IRB responsibilities to Oklahoma State University (see Appendix III). A new section was added on gender and resilience, informed by SES resilience and FPE literature that focuses on the inclusion of gender as well as the subcodes defined in the theoretical framework of this proposal. These additional research questions focused on elucidating perceptions of women in agriculture, personal experiences with barriers and opportunities, women's involvement in varying SES-FPE components, and their current experiences with agricultural policy and institutions. The interview guide served as a model, meaning that questions could be reworded, and follow-up questions were asked to probe for further information on a given topic. These questions focus on the specific experiences of women and their perceptions, as well as the resilience strategies women are equipped to overcome

challenges. The key informant interviews used the same SES-FPE coding structure as the oral histories answered questions 2 and 3 of this research project.

Participants were provided with a project information sheet (see Appendix IV) that outlined the purpose of the ARID project, the interview procedure, the risks of participation, the benefits of participation, a confidentiality agreement, an IRB-approved interview guide, and contacts for both the researcher in charge, Dr. Vadjunec, and the Institutional Review Board. Interviews lasted approximately one hour, with some going longer with the participants' permission and enthusiasm. To encourage open conversations, participants' identities were kept anonymous in the documentation.

These interviews were not recorded; they were only noted in a fieldwork notebook. The information recorded in the notebook included the date and time of the interview, location, number of participants, gender of participant(s), the county from which the participant (s) were, and the interviewee's general occupation. Participants are kept anonymous in any published presentations of material collected during interviews to preserve participants' identities and safety. Notes-only and anonymous interviews were preferred to ensure the privacy and confidentiality of participants and the information they provided. Additionally, these interviews operate on verbal consent from the participants. Thus, after the participant has been provided with the project information sheet and the interviewer has reviewed it, and given the participant time to review it, the participant was asked for their consent to the interview. Consent was documented in the fieldwork notebook. During interviews, handwritten jotted notes were taken and later turned into more descriptive notes. Jotted notes included key talking points, direct quotes, stories, numbers, policies, programs, resources, community events, and others to refresh my memory later when writing descriptive notes (Emerson, Fretz, and Shaw 1995; Schensul and LeCompte 2013).

Descriptive notes were typed in Microsoft Word as soon as possible after the interview ended (Schensul and LeCompte 2013) and shared with Dr. Vadjunec for feedback and later research outside of this master's thesis. Descriptive notes included expanding on jotted notes and recording paraphrased or direct quotes from the participant's interview into a cohesive narrative (Emerson, Fretz, and Shaw 1995; Schensul and LeCompte 2013). In total, 593 pages of descriptive notes were written from the key informant interviews. Inferences were drawn about what the participants were referring to and how each interview fits within the theoretical framework of this project.

To analyze these interviews, the same FPE framework used for the oral histories was applied, enabling comparable conclusions across the qualitative datasets. Like the oral histories, these interview notes were coded in NVivo, where references included excerpts or narratives over several lines of text that present a point or story relevant to the code (Abrams 2016). The key informant interviews were compared and reviewed by Dr. Vadjunec and me to ensure intercoder reliability. Total references and percentages were derived from each coded SES-FPE. This method ensures that resilience processes and definitions are defined by the communities themselves while also being informed by resilience literature as themes arise. Comparable emergent themes are drawn from each SES-FPE component, e.g., environment, economic, production, institutional, community, and intrahousehold, for ample comparisons between qualitative datasets to identify parallels and differences between them (LeCompte and Schensul 2010).

3.4 Synthesis

The three main research questions provide a broader picture of what women agriculturalists experience when engaging in resilience processes, using Agricultural Census data, oral histories, and key informant interviews. SES comprises multiple subsystems, all influenced by gender,

making the experiences of women in agricultural communities highly complex. This synthesis aims to show how each data stream informs the other and to outline the methodologies used to create a broader story of the complex relationship between gender and SES.

3.4.1 Comparing USDA Producer Information and Women's Experiences (Q1, Q2)

The USDA producer information provides details on how gendered participation in agriculture is formally recorded and perceived at the national level. Centering women agriculturalists, the producer counts will provide both female and male producer counts, as well as land ownership, across counties (for context/comparison). Additionally, this producer information is intended for comparison with oral histories and key informant interviews, in which women agriculturalists report their experiences with agricultural production. The oral histories sometimes include recollections dating to the early 1900s, predating the first recording of women in the Agricultural Census data. Thus, by creating a time-series graph of producer information for both men and women, I will compare these results with coded interviews of lived experiences that predate the Agricultural Census reports. It should be noted, however, that recollections vary, and accuracy cannot be guaranteed in oral histories or interviews; instead, they focus on lived experiences (Vadjunec et al. 2021). Therefore, the producer information provides the formal representation of agriculturalists on a national scale from the USDA Agricultural Census Reports, while the qualitative sources add the on-the-ground experiences of agriculturalists in the study area. Additionally, as policies vary by county, the results may show interesting dynamics tied to Cartesian boundaries, despite similar agricultural livelihoods across counties.

3.4.2 Oral Histories and Key-Informant Interviews (Q2, Q3)

From the oral histories, the SES of the agricultural communities is presented in rich detail, with areas of tension, interaction, and resilience successes expressed. The oral histories provide context and information over a longer period that focus on resilience to drought and other environmental hazards in response to SES disruptions. The oral histories also provide insight into how their lived experiences as women have shaped their experiences with, and responses to, SES disruptions from the past up to 2015-2016. Revisiting some of the previous participants in the key informant interviews and examining other key actors in resilience (e.g., government employees or institutional actors) reveals how resilience occurs in practice. Additionally, the subcodes used in the oral histories and key informant interviews highlight how SES in these agricultural communities has changed, in what ways, and which facets of SES are important to the community during SES disruptions. The oral histories and key informant interviews will be brought into conversation to reveal how women contribute to SES resilience. Both oral histories and key informant interviews can reveal the barriers and opportunities to cultivating resilience among women in agricultural communities.

3.4.3 Linking USDA Producer Information, Oral Histories, and Key Informant Interviews (Q1, Q2, Q3)

Each methodology used here informs the others in order to triangulate results. The producer information serves as a temporal benchmark for discussing women in agriculture, starting in 1978. In particular, the producer information shows what is being recorded at the national level, or the formal representation of women in agriculture, to answer question one of this project. Additionally, the producer information served as a reference in the key-informant interviews, particularly regarding the impact of policies on women in agriculture (see interview guide, Appendix I). The

oral histories provide the long-term, lived experiences of women in the study area, with many discussing their childhoods and families dating back to the early 1900s. Their stories illustrate the complex ways women have engaged in both agriculture and SES resilience in agricultural communities. The key informant interviews further reveal how women's participation in agriculture and SES resilience in agricultural communities are perceived on the ground, at the moment (shorter temporal scales).

3.5 Funding and Affiliation

Research in the study area is ongoing by the committee chair, Dr. Vadjunec, for almost two decades. The beginnings of Dr. Vadjunec's work before coming to the University of Oklahoma start with an oral history-related project to collect oral histories from (particularly female) survivors of the Dust Bowl to study collective memory as a means of adaptation to long-term cyclical drought in the Southern Great Plains. The project has transformed to capture SES resilience, water and land governance, and community legacy/identity in resilience building. The oral histories, which are part of this project, including interview design, field visits, and transcriptions, were funded by a National Science Foundation (NSF) research grant (#CMMI-1266381, Vadjunec, Fagin & Phillips).

This work was also supported by the United States Department of Agriculture-National Institute of Food and Agriculture, grant number 2018-68002-28109, *Participatory approaches to Agroecosystem Resilience In times of Drought (ARID): An example from the Southern Great Plains*. This ARID grant funded me as an undergraduate research assistant through the Center for Spatial Analysis (Dr. Todd Fagin). This experience as an undergraduate introduced me to the study area through research and community engagement events. Additionally, the University of

Oklahoma's College of Atmospheric and Geographic Sciences has been fundamental in supporting my graduate research assistantship by providing start-up funds to my advisor and committee chair.

Additional exposure to the study came from my experience as an undergraduate student through funding from the United States Geological Survey (104)g grant, "*Fostering Student Training & Enhanced Educational Opportunities on Groundwater Management*," through a cooperative agreement, G21AP10597, and Oklahoma State University's Oklahoma Water Resources Center. This exposure to the study area became crucial for getting started with this project to best tailor the research goals and intent within the context of the two counties. Additional funding for fieldwork and to conduct the key informant interviews was funded by the University of Oklahoma's College of Atmospheric and Geographic Sciences Travel and Research Award and the Southwest Division of the American Association of Geographer's Student Summer Field Award. The University of Oklahoma's College of Atmospheric and Geographic Sciences also helped fund this project through Dr. Vadjunec's startup funds, which were generously provided to ensure lodging for fieldwork in the study area. Lastly, Dr. Fagin further supported my fieldwork endeavors.

Institutional Review Board approval for my research is through Oklahoma State University (OSU), where Dr. Vadjunec remains an affiliate faculty member and the grants were housed, and the IRB remains active (OSU IRB AS-18-24). As for training, I have completed all required training for human subjects research as specified by OU IRB guidelines, including training in Community-Engaged Research, Social Behavioral Modules, Information Privacy Security, Responsible Conduct of Research, and the Revised Common Rule (see Appendix II).

Any opinions, findings, or conclusions expressed in this project are those of the authors and do not necessarily reflect the views of the NSF, the USDA, USGS, or the principal investigators' institutions.

3.6 Conclusion

This chapter describes the methodologies used for this study, the key pieces each dataset addresses, how the methodologies are triangulated and put in conversation with one another, and the funding and affiliations associated with this project. Using a mixed-methods approach enabled a multiscalar and multitemporal understanding of the history and contemporary experiences of women in agriculture. The results of the analysis of the Agricultural Census reports, oral histories, and key informant interviews will be discussed next, focusing on the components of SES of interest to the participants, as well as comparisons between national and local views of women in agriculture.

CHAPTER IV – RESULTS

Introduction

Chapter 4 presents the results of the project’s mixed-methods analyses. The first section covers trends and patterns seen in the historical USDA Agricultural Census reports from 1978 to 2022 across and between the two counties. The qualitative coding results are broken into two main sections: the first section addresses the emergent themes arising from the coding analysis of the oral histories, and the second section explores the emergent themes arising from the coding analysis of the key informant interviews. The final section addresses the parallels and differences between methods.

4.1 Historical Agricultural Census Reports

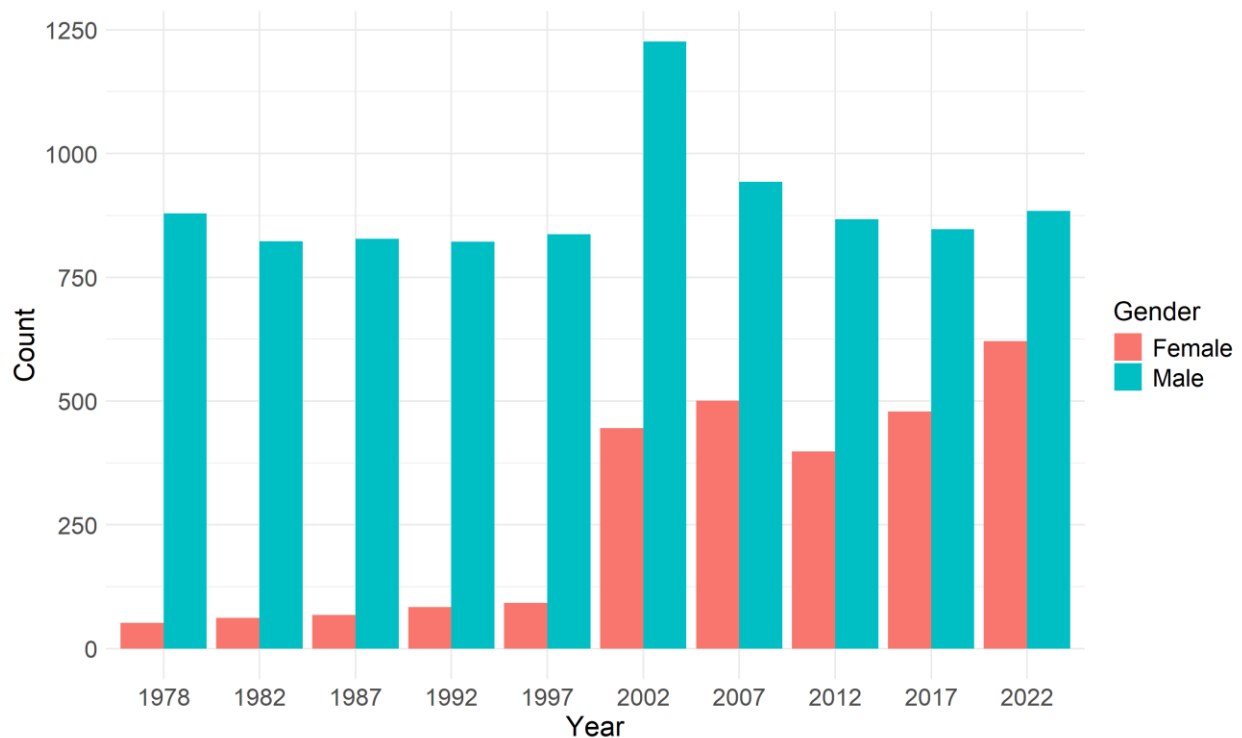


Figure 3: Total producer counts by gender in Cimarron County, OK, and Union County, NM, reported in the United States Department of Agriculture’s Census Reports from 1978 to 2022.

Table 4: Statistics from the USDA NASS Agricultural Census reports from 1978 to 2022 for Cimarron County, OK, and Union County, NM, combined. Statistics include total producer counts by gender, percent changes from the previous year by gender, percentages of female to male producers out of the total, and agricultural land operated by gender, with percentages of total land.

Year	Female Producer (% Change)	Male Producer (% Change)	% of Female Producers	% of Male Producers	Female Land in Farms (ha) (%)	Male Land in Farms (ha) (%)
1978	52 (-)	879 (-)	5.59	94.41	55,511 (5.04)	1,046,434 (94.96)
1982	62 (19.23)	823 (-6.37)	7.01	92.99	89,886 (6.44)	1,306,777 (93.56)
1987	68 (9.68)	828 (0.61)	7.59	92.41	75,351 (5.16)	1,385,730 (94.84)
1992	84 (23.53)	822 (-0.72)	9.27	90.73	106,822 (7.76)	1,268,906 (92.24)
1997	92 (9.52)	837 (1.82)	9.90	90.10	106,636 (7.97)	1,230,616 (92.03)
2002	445 (383.70)	1226 (46.48)	26.63	73.37	119,833 (8.80)	1,242,002 (91.20)
2007	501 (12.58)	943 (-23.08)	34.70	65.30	134,753 (10.29)	1,175,331 (89.71)
2012	398 (-20.56)	867 (8.06)	31.46	68.54	121,309 (9.59)	1,143,182 (90.41)
2017	479 (20.35)	847 (-2.31)	36.12	63.88	493,356 (30.43)	1,128,018 (69.57)
2022	621 (29.65)	884 (4.37)	41.26	58.74	701,847 (38.22)	1,134,369 (61.78)

The historical Agricultural Census reports track changes and trends in producer demographics. Each county's producer counts are examined together, separately, and compared with one another. Both counties show an increase in the number of female producers from 1978 to 2022 (Figure 2). Small differences can be observed between the counties, but trends are similar in both Cimarron and Union County. Overall, there is a consistent imbalance between female and male producers in the study area. In earlier years from 1978 to 1997, male producers greatly outnumbered female producers, ranging from 5 to ~8% of the total proportion of producers (Table 4). The gap between female to male producers begins to narrow in later years from 2002 to 2022, yet despite this growth, men continue to make up the majority. Additionally, in 2002, the

Agricultural Census began collecting data on more than one producer, thereby making this increase misleading. However, the increase in female producers over the period reflects a gradual shift in a male-dominated agricultural system.

Results show that, overall, the number of female producers in the study area has increased steadily over time, rising from 52 to 621. The female-to-male ratio of producers begins to level off over the time period. From 1978 to 2022, female producers increased by 1094.23%. In both counties, male producer counts are consistently higher. In 1978, there were 52 female producers (5.59%) and 879 male producers (94.41%) among both counties. In 2022, there were 621 female producers (41.26%) and 884 male producers (58.74%). Thus, while the female-to-male producer ratio (gap) has decreased, women still make up the minority.

The greatest increase in female producers between reports occurred from 1997 to 2002, increasing from 92 to 445, a 383.70% increase. Yet, despite a small increase in the 2007 report, female producer counts decreased by 20.56% in 2012 and subsequently increased by nearly the same amount in the following year of 2017. Other noteworthy jumps in female producers occurred in 1992, with a 23.53% increase over the previous year, and in 2022, with a 29.65% increase. Trade-offs between female and male producer counts are reported in a few reports, where an increase in female producers and a decrease in male producers occur in the same report. In 1982, 1992, 2007, and 2017, there were increases in female producers and decreases in male producers. However, the opposite is true for the 2012 report, where a sharp decrease in female producers and an increase in male producers occurs. In 2012, this is the only case of female producers decreasing. Similar growing trends are reflected in the reported agricultural lands operated by women. Women consistently hold a smaller share of total agricultural land, but the percentage and share of total land increases over time.

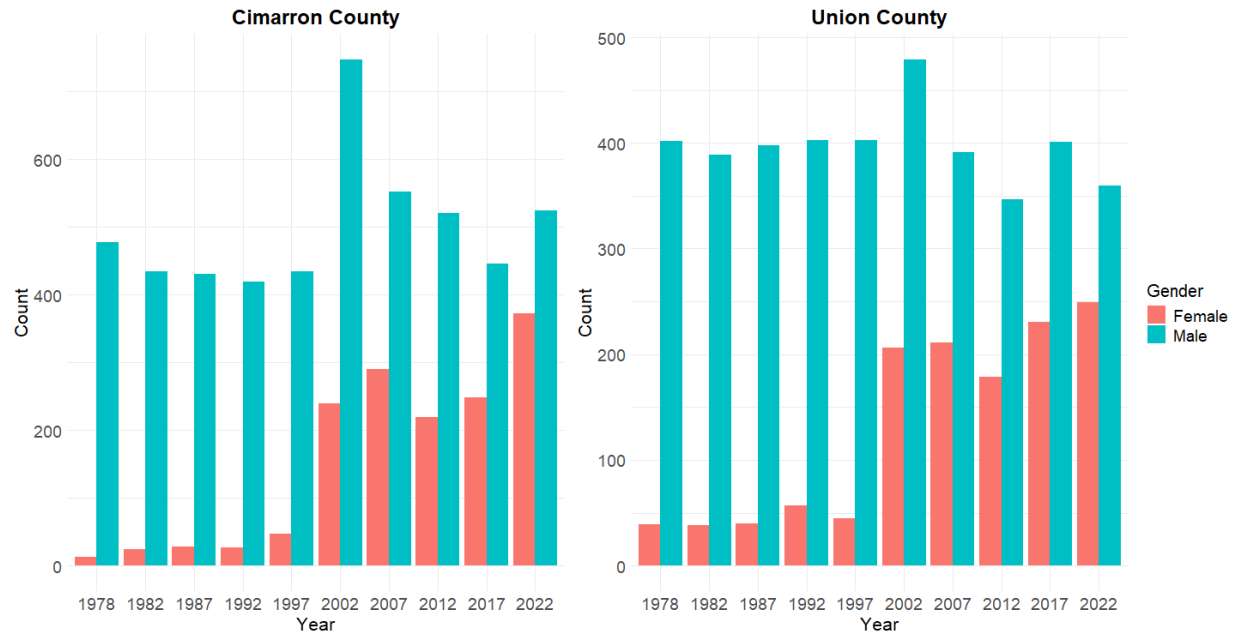


Figure 4: Total producer counts by gender in each county reported in the United States Department of Agriculture’s Census Reports from 1978 to 2022.

Table 5: Statistics from the USDA NASS Agricultural Census reports from 1978 to 2022 for Cimarron County, OK. Statistics include total producers counts by gender, percent changes by gender from previous year, percentages of female to male producers out of total, and agricultural land operated by gender with percents of total land.

Year	CC Female Producer (% <i>Change</i>)	CC Male Producers (% <i>Change</i>)	CC % of Female Producers	CC % of Male Producers	CC Female Land in Farms (ha) (%)	CC Male Land in Farms (ha) (%)
1978	13 (-)	477 (-)	2.65	97.35	6,230 (3.47)	173,172 (96.53)
1982	24 (84.62)	434 (-9.01)	5.24	94.76	18,931 (4.33)	418,174 (95.67)
1987	28 (16.67)	430 (-0.92)	6.11	93.89	14,671 (3.60)	392,626 (96.40)
1992	27 (-3.57)	419 (-2.56)	6.05	93.95	20,268 (4.84)	398,582 (95.16)
1997	47 (74.07)	434 (3.58)	9.77	90.23	30,417 (6.98)	405,440 (93.02)
2002	239 (408.51)	747 (72.12)	24.24	75.76	54,952 (12.11)	398,990 (87.89)
2007	290 (21.34)	552 (-26.10)	34.44	65.56	38,010 (8.99)	384,705 (91.01)
2012	219 (-24.48)	520 (-5.80)	29.63	70.37	63,125 (13.48)	405,182 (86.52)
2017	248 (13.24)	446 (-14.23)	35.73	64.27	160,582 (27.71)	418,931 (72.29)
2022	372 (50.00)	524 (17.49)	41.52	58.48	253,439 (36.36)	443,633 (63.64)

Table 6: Statistics from the USDA NASS Agricultural Census reports from 1978 to 2022 for Union County, NM. Statistics include total producer counts by gender, percent changes from the previous year by gender, percentages of female to male producers out of the total, and agricultural land operated by gender, with percentages of total land.

Year	UC Female Producers (% Change)	UC Male Producers (% Change)	UC % of Female Producers	UC % of Male Producers	UC Female Land in Farms (ha) (%)	UC Male Land in Farms (ha) (%)
1978	39 (-)	402 (-)	8.84	91.16	49,280 (5.34)	873,262 (94.66)
1982	38 (-2.56)	389 (-3.23)	8.90	91.10	70,955 (7.39)	888,603 (92.61)
1987	40 (5.26)	398 (2.31)	9.13	90.87	60,680 (5.76)	993,105 (94.24)
1992	57 (42.50)	403 (1.26)	12.39	87.61	86,554 (9.05)	870,323 (90.95)
1997	45 (-21.05)	403 (0)	10.04	89.96	76,219 (8.46)	825,176 (91.54)
2002	206 (357.78)	479 (18.86)	30.07	69.93	64,881 (7.15)	843,012 (92.85)
2007	211 (2.43)	391 (-18.37)	35.05	64.95	96,743 (10.90)	790,627 (89.10)
2012	179 (-15.17)	347 (-11.25)	34.03	65.97	58,184 (7.31)	738,000 (92.69)
2017	231 (29.05)	401 (15.56)	36.55	63.45	332,774 (31.94)	709,087 (68.06)
2022	249 (7.79)	360 (-10.22)	40.89	59.11	448,408 (39.36)	690,737 (60.64)

Between Cimarron and Union County, Cimarron County had more total producers during the period, on average, with 649 compared to Union County's average of 526.8 producers. The average number of male producers in Cimarron County is 498.3, while Union County's average number of male producers is 397.3. Female producers, however, had similar averages between counties. Cimarron County's average number of female producers is 150.7, while Union County's is 129.5 (Figure 3). Significant changes in county producer compositions are recorded in differing time frames (see Tables 5 and 6).

Small sample sizes for both counties show large increases from the beginning of the period to the most recent report. Female producers increased by 2761.54% in Cimarron County and by 538.46% in Union County since 1978. The largest increase in female producers between reports for Cimarron County occurred between 1997 to 2002, from 47 to 239 (a 408.51% increase) and the same for Union County, from 45 to 206 (a 427.50% increase). Both county reports show a decrease in female producers in 2012, followed by an increase in the subsequent report (Tables 5 and 6). At the county level, the same trends in producer counts and land are observed. However, in the 2017 report and in 2022, land operated by women and men increased in both counties. The differences between women and men, however, vary.

Between counties, differences are large. Despite having fewer female producers, Union County consistently has more land than Cimarron County, except in 2012. This may suggest that female producers operate on larger farms or that operations in Cimarron County are more intensive. Although overall producer counts vary among and between counties, female producers hold smaller portions of land than male producers. In general, female producers from 1978 to 2012 hold ~3 to 14% of land. From 2017 to 2022, female producers held a larger share, yet it remained below that of men, ranging from 27 to 39% (see Table 5). The reports showing a large increase in female producers are not always reflected in the increases in land owned or operated by women.

Across both counties, women held ~5% of total land in 1978 and ~38% in 2022, representing roughly a 30 percentage-point increase in the proportion of land women operated on over the period. Total land operated by women has increased by 1164.34%, starting from 55,511 hectares to 701,847 hectares. The percent increases of land women own from the previous year do not always align with increases in total female producers. While female producers increased by 383.70% from 1997 to 2002, female-owned agricultural lands only increased by 0.93% during the

same period (Table 4). Unlike the trends seen in female producer counts, the largest increase in female-owned land occurs much later, from 2012 to 2017, rising from 9.59% to 30.43% of total agricultural land. The same is seen between counties, where large increases in female producers are not necessarily reflected in agricultural lands.

The largest increase of land in both counties is seen from 2012 to 2017, with a 471.93% increase in Union County and a 154.39% increase in Cimarron County. Where the number of female producers increased substantially from 1997 to 2002, results show that agricultural lands operated by women in Cimarron County increased by 80.66%, while those in Union County decreased by 14.88% (see Tables 5 and 6). In both counties, the number of female producers and the amount of land operated by women increased from 1978 to 2022. However, the proportion of female producers among all producers does not necessarily reflect the share of total agricultural land operated by women, particularly from 1978 to 2012 (see Tables 5 and 6). Overall, women hold less than 40 percent of agricultural land, even with growth from 1978 to 2022.

4.2 Coding results from Oral Histories

The coding of the oral histories identified common experiences and perceptions of women amongst individuals related to agriculture, community, and identity, and addresses research question two of this project. The content of the oral histories spans individual experiences and broader community perspectives over time. Thus, to address the nuances and complexity of the qualitative coding, the oral histories are discussed in multiple parts, beginning with overall trends across SES components followed by an in-depth look at the core SES components outlined in the theoretical framework, e.g., environment, economic, production, institutions, community, and intrahouseholds. These sections highlight the key and shared gendered experiences are identified in the coding analysis of the oral histories, drawing on the FPE and SES themes.

4.2.1 Trends in Oral History Coding

The oral histories reveal many barriers and opportunities for women in agricultural communities. Across 593 pages of transcript, a total of 10,906 observations were made. Amongst the SES-FPE components (i.e., environment, economic, production, institutions, community, and intrahousehold), community (24.79%) and environment (21.94%) are coded the most. Coded observations for production (16.61%) and institutional (15.52%) are the third and fourth most coded SES-FPE components, respectively. Economic (11.60%) ranks fifth among the most coded, and intrahouseholds (9.53%) are discussed the least out of the SES-FPE components (Table 7).

Table 7: Statistics and emergent themes from qualitative coding of the oral histories by converged SES and FPE components.

SES-FPE Component	Reference Count (%)	Emergent Themes
Environment	2,393 (21.94)	• Familial/generational land access • Household land use • Adaptations to environmental impacts and changes
Economic	1,265 (11.60)	• Market pressures on environmental resources • Engagement with local economies for resilience
Production	1,812 (16.61)	• Invisible agricultural labor • Transitions and difficulties in decision-making • Technological barriers to participation
Institutional	1,693 (15.52)	• Supplemental financial funding • Leadership and representation • Limited support for rural institutions
Community	2,704 (24.79)	• Informal community leadership fostering community identity for resilience • Outmigration and community restructuring
Intrahousehold	1,039 (9.53)	• Intergenerational resilience • Intrahousehold agency in decision-making and responsibilities
Total References	10,906	

Within the SES-FPE components, emergent themes and topics from the oral histories served as key indicators of women's experiences in rural agricultural SES in the two counties (Table 7). The emergent themes encompass topics pertaining to the early Dust Bowl days to the near present of the data collection period (2014-2015). Many overlaps exist amongst the emergent themes in different SES-FPE components, which are addressed in the following sections. The emergent themes focus on women's experiences with each SES component. The following subsections address question two and its sub-questions of this project by exploring the gendered narratives of women in rural agricultural communities, with a focus on the barriers and disparities they face. Barriers and entry points to participation, as well as strategies for SES resilience, are explored with excerpts from interviews.

4.2.1.1 Environment

The environment can encompass multiple forms of resources or conditions. In the study area, discussions of land, water, and environmental conditions, such as drought, account for 21.94% of the coded oral histories. The purposes of these environmental resources, however, can vary from individual to individual. Amongst women in the oral histories, engagement with the environment ranges from large-scale agricultural operations to small-scale household land use. Additionally, the different types of access to environmental resources and experiences with drought are uniquely gendered. Emergent themes included familial and generational land legacies, household land use, and adaptations to environmental impacts (Table 7). The following examines shared experiences with environmental systems in the study area, drawing on individual stories to explain these themes in participants' own words.

Familial and Generational Land Access

The oral histories encompass over a century of lived experiences and familial histories in agriculture in the Southern Great Plains. Many participants come from families that have lived in the area for more than a century, with some histories dating back to the late 1800s. Thus, deep-rooted histories in agriculture are found amongst participants. One participant recollects her family's history in the study area, dating back to the early Homestead Act (1862) era (NPS 2022):

“Well, my dad was a farmer. His father homesteaded, so they had land there. It was a big family, and my father had to quit school when he had gone through the third grade to help make a living for the family. My mother’s parents were farmers, too. Mom grew up there at Quay, and so did my dad.” (Resident, Union County, NM)

Participants report that intergenerational lands are often passed down or between the men in these families. Many women report that accessing agricultural lands after leaving their immediate family is through marriage, where either male spouses buy land outright, or male spouses inherit family operations that many women marry into. When pursuing land, men are often the decision-makers in these spaces. Several women report that family lands are split or obtained through a joint venture between fathers or fathers-in-law and their male spouses.

In many cases, women own or have personal access to land through joint family ventures, in which land is divided among family members by will or deed. For instance, as one woman states:

“Then just three years ago, [my father] deeded it to my two brothers and I that’s left. I’ve had two brothers pass away. Then one brother, he sold his part to... my son. [My son] and I own two-thirds, and [my brother] owns a third. I hope to get his third from him, and it’ll be our place then.” (Resident, Cimarron County, OK)

This dynamic can induce competition amongst family members, where women may not have the same intrahousehold bargaining power as the men in their family. In some cases, women’s spouses

or fathers pass away, and the land is then passed onto them. Thus, to access land, women often have fewer avenues, leaving them to depend on renting land or on their spouses, ex-partners, or late spouses. One participant shares her experience inheriting land in the late 1970s:

“It belonged to his parents, and they gave us a quarter of land. He moved a house in there, and that’s where we lived. After his parents passed away, we inherited the other quarter. I did. He was already passed.” (Resident, Cimarron County, OK)

This participant’s story is one of many. Several interviewees inherited land from their spouses after their spouses' deaths. Historical gender norms structure land inheritance, with women gaining access to land much later in their family histories through self-initiated efforts to remain in agriculture. However, because of these gender norms, women find access to environmental resources through other means, often on a smaller scale.

Household Land Use

When not involved in agriculture, many women expressed their own or their mother’s use of environmental resources on a smaller scale for household purposes, such as gardens, milk cows, or chickens. These small-scale land uses are passed down between generations as a key to surviving in the semi-arid region. Household land use is often the domain of women, where access to land for large-scale agriculture was structured by gender norms. Two examples are drawn to explain the scale and purposes of household land use:

“Always had a huge garden. My mother put up all kinds of canned goods and stuff. After we moved the store, we didn’t have a garden anymore. My sister and I’d make one once in a while because we liked the squash, tomatoes, and stuff like that. We always had a big ol’ garden.” (Resident, Union County, NM)

and

“Grandma stayed home and ran the farm. They didn’t have the bigger sections of sorghum to grind for molasses or anything, but she grew a vegetable garden and milked the cow and raised the chickens.” (Resident, Cimarron County, OK)

Home gardens and small-scale ranching are often central to household food provision and involve distinct knowledge systems for their maintenance. Women often take various measures to balance resource scarcity and overcome the difficulties of maintaining these environmental resources. This can include changing the vegetables or fruits cultivated, maintaining soil health by using production by-products such as manure, or adjusting practices based on rainfall. Thus, women's access and navigation of environmental resources vary due to the barriers imposed by historical cultural norms. Additionally, the variability of the semi-arid environment in the Southern Great Plains poses barriers and limitations to engagement with environmental resources.

Adaptations to Environmental Impacts and Changes

The Southern Great Plains is infamously characterized by cyclical, prolonged drought, infrequent precipitation, and water scarcity (Carrasco Galvan, Vadjunec, and Fagin 2024). Agriculture is notably considered by the participants as a variable business or a gamble. Water scarcity is one of the most common topics of conversation amongst participants, with consequential negative effects on land, crops, and livestock. Women, however, experience intensified exposure to environmental hazards at the personal, household, or operational level. Maintaining land during times of drought led to various insecurities and threats to agricultural livelihoods and health. Many families struggle to remain in drought-prone areas, while many others leave due to harsh environmental conditions. For those who stayed, drought made it difficult for producers to survive. With livelihoods heavily dependent on environmental resources, the effects of drought can be devastating. Adaptations to these environmental hazards are often passed down through generations or through lived experience during droughts. One participant recollects her family's ranching experience during the Dust Bowl:

“There was a lot of sand blowing. They got a lot of the dust. They talked about how hard it was to pay for the land at that time because of the Dust Bowl. Plus, the Depression hit at the same time. They talked a lot about—without the milk cows and Mother had chickens, they never would’ve been able to pay for their land. It was a tough time.” (Resident, Union County, NM)

Female producers discuss the adaptations they undertook during times of drought, including selling off livestock to maintain a smaller herd, reducing water use, or not watering at all. The effects and intensity of drought can last for several years, during which resilient attitudes become key to preserving hope that the next year will be wet. Every drought brings new obstacles, necessitating adjustments “each year accordingly” (Resident, Union County, NM). The types of production, whether farming or ranching, are interrelated as one female producer notes in the latest drought of the 2010s:

“Well, a couple years ago, a lot of people had to sell their cattle because of the drought. That’s another thing. You don’t have crops, you can’t raise cattle because they have nowhere to eat. A lot of them had to get rid of their home cows that they’d had forever and some that they were raising because they had no place to take them. That was sad, but this last year, it’s starting to build back up.” (Resident, Cimarron County, OK)

The same participant discusses the current conditions at the time the oral histories were collected in 2015-2016 and notes that:

“It looks great right now because we’ve had this three inches of rain, and I think it will build up. The ranchers are going to be happy, and the farmers are going to be happy. I think it’s going to be a great happiness in this community, really.” (Resident, Cimarron County, OK)

The environmental effects of environmental hazards, such as drought, tend to be experienced similarly amongst agriculturalists. Yet, the lessons learned from past droughts inform later adaptations. This can include how to allocate water resources, when to harvest, or how to sell cattle, where experience with the harsh environment is crucial for success in the area. An independent female producer reflects on how she mitigated drought on her operation:

“In 2011, I think, I sold off 50 percent of my cowherd because you keep hanging on, waiting for that rain. I finally decided I had to do that. If I ever had to do that again, I wouldn’t hang onto them that long. We’d move them on faster because you can’t hardly feed a cow through a drought, for that long of a drought.” (Resident, Union County, NM)

As with much of the agricultural business, knowledge of managing environmental resources during drought is often developed through experience or passed down. Many agriculturalists in the area aim to plan for the next year with the knowledge and experience of past droughts. The effects of past droughts leave lasting impacts on the management of land where several producers emphasize that environmental resources are usually scarce. As one female producer states:

“Just not overgraze or be prepared to roll with it. There’s nothing you can do, but if you overgraze that land, we’re going to be back in a dust bowl. If you don’t take care of it, it’s not going to take care of you.” (Resident, Union County, NM)

Even when more stable irrigation systems were implemented, like center pivot irrigation, largely using groundwater, female producers report making changes to crop types (e.g., wheat or milo) on their operations with the understanding that water resources are finite:

“I know now, to me, whenever we was raising crops and even after we had irrigation, we raised stuff that didn’t take as much as the corn does. Now, corn takes it a lot more. I often wondered if people come out in it, paying so much to water and all. I’m sure they’ll have a good year this year, thank God.” (Resident, Union County, NM)

The effects of drought are multifaceted. Those involved with agriculture have developed deep knowledges based on hardships and experience with previous and current droughts. Beyond maintaining clean conditions, women actively adapted household spaces and routines to reduce exposure and sustain healthy living conditions like managing the dust from droughts/wind accumulating inside the home. Yet, women’s engagement with environmental resources is but one SES component influenced by historical gender norms. Next, economic factors and systems are discussed through the lens of women in the study area.

4.2.1.2 Economic

Economic SES components include income, funding, occupation changes, and market conditions. Discussions of economic conditions account for 11.60% of total observations among the SES components. Like environmental systems, the effects and scale of economic dynamics are broad. Themes emerging from the oral histories included market pressures on environmental resources and engagement with local economies for resilience (Table 7). The following examines how large-scale economic dynamics affect the livelihoods of women in and outside of agriculture. In particular, the emergent themes draw on the adaptations women make to cope with financial strain and the variability of agricultural livelihoods, as shared among female participants.

Market Pressures on Environmental Resources

The persistent and disastrous nature of drought can make agriculture a highly competitive business. Despite hardships, families in the study area have successfully adapted to drought, yet new burdens are imposed on producers to keep up with market pressures and competition among other producers. Notably, many participants suggest that the success of producers in the area has made environmental resources such as land, livestock, and water far more expensive. In general, it “takes more acres to make a living” in the study area (Resident, Union County, NM). Many participants suggest this is one barrier to success in agriculture, particularly for new or female producers. The economic pressures on resources like land increase the monetary value, often making it unattainable or difficult to keep. In cases where women continue to engage in agriculture despite family lands being passed to men, many female producers are left to rent or lease farmland, with prices having increased over time. One female producer encapsulates this trend from her own experience:

“As the farming got more and more prosperous for people, it got higher and higher for us to lease or rent farmland. My brother was farming Daddy’s farm, so my husband and I had to depend on renting farmland. It had just got where it wasn’t very profitable because it cost so much money, so my daddy and my husband decided that we needed to make a move.” (Resident, Union County, NM)

Many participants compare the economic viability of agriculture in previous generations with current conditions, suggesting that agriculture has become a far greater expense overall due to operational standards and expectations. In general, to start and keep going in agriculture, you “got to have lots of money” to fall back on when production fails or as operations are starting up (Resident, Union County). As one producer comments:

“Oh, I think it’s very hard to do. If we hadn’t have had what we had, to be able to buy this place, we wouldn’t have—that was our goal, to be able to make enough money to buy a place. A young person can’t even go there today.” (Resident, Cimarron County, OK)

With rising prices and land competition, newer or younger producers have fewer avenues to enter or remain in agriculture, discouraging people from staying in the area. Additionally, the compounded financial consequences of managing the land deter producers from buying land, such as the financial strains imposed by limited water availability, the resources required for healthy soils, and the lengthy timeframes necessary for the benefits of agricultural production to show. Women tend to be more vulnerable to these conditions, as financial cushions may be lacking due to patriarchal land legacies. Thus, in joint operations, many women undertake off-operation jobs that provide additional personal insurance or stable incomes for the household to adjust to rising prices of environmental resources. In agricultural households across the oral histories, women’s labor is diverse, bridging agricultural duties and professional duties at their jobs in town.

Engagement with Local Economies for Resilience

Women in the oral histories are often engaging with local economies, both informally and formally. Informally captures the small-scale markets women access, often selling eggs or milk from household agricultural operations. Formal engagement includes occupations outside agriculture, often held in town. Overall, women tend to be key actors in bolstering local economies and maintaining communities through hardship.

Women's engagement with informal markets was and is key to maintaining personal livelihoods as well as supporting overall community resilience. As discussed in the coding results for the environment, women's household-scale land use provided important commodities to trade amongst neighbors and income to help mitigate financial strains in agriculture, particularly during drought. During the Dust Bowl and Great Depression, women discussed bartering amongst the community for supplemental income:

“I think there was a lot of bartering that went on at that time. You could help a neighbor, and the neighbor could pay in eggs or chickens or something.” (Resident, Cimarron County, OK)

and

“They talked about how hard it was to pay for the land at that time because of the Dust Bowl. Plus, the Depression hit at the same time. They talked a lot about—without the milk cows and Mother had chickens, they never would've been able to pay for their land. It was a tough time.” (Resident, Union County, NM)

Formal engagement in local economies often entailed women holding jobs in government institutions such as post offices, election boards, schools, medical facilities, and other civic institutions. While there are several cases of both spouses holding jobs outside agriculture, women are more often seen investing in local economies through joint ventures to maintain agricultural livelihoods.

“I did for twenty-six years, but then I was home when my children were home. I drove the school bus. I was home when they were home, and when they got out of school, I was off. I didn’t start working for the hospital until after they went to college. Then I had two jobs.”
(Resident, Union County, NM)

Without these supplemental forms of income, surviving through environmental and economic hardship would be far more difficult. In later years, as the costs of production and environmental resources increased, at least one spouse holding a position off the operation became necessary for survival. Women are more often seen participating in local economies in earlier histories yet in later years, both spouses find that having two incomes is crucial for maintaining agricultural livelihoods.

“We had two incomes living here, so it was a really, almost a perfect situation for us because he could work for his dad, we could have a little cattle of our own, and I could have an income, too. We could make it work... That’s part of the reason, that’s not the only reason that we can live here at the ranch, but like he said, you kind of have to have two incomes.” (Resident, Union County, NM)

Women’s engagement in local economies is not only important for household stability but also beneficial for community resilience. Yet, women’s duties, roles, and responsibilities are often more diverse than those of their male counterparts. This is but one form of women’s invisible labor in agricultural households, adapting to and responding to socioecological disruptions. In production, women often perform labor that may go unrecognized on a larger, national scale.

4.2.1.3 Production

From early childhood to adulthood, women experience agriculture intimately. However, the roles and responsibilities required for agricultural operations tend to be gendered, particularly in early family histories. Production includes the labor and overall management of agricultural operations. Women in the oral histories discuss production in 16.61% of the coded references. Emergent themes capture the invisible agricultural labor of women, trends and changes of female labor, transitions and difficulties in management, and technology as a barrier to success (Table 7).

Invisible Agricultural Labor

Participants in the oral histories emphasize that agricultural operations are family-oriented. Those growing up on farming or ranching operations had chores, such as feeding chickens or pigs, milking, checking cattle, or checking for rain the next day. Responsibilities for these agricultural chores are more often delineated by age than by gender. Older children, boys and girls, in family operations help parents with daily duties. Yet many women report that as young girls, they had to manage both agricultural chores and household work.

“Yeah, we fed horses, cleaned stalls, fed cattle, unloaded trucks, loaded trucks, house chores like any girl gets to do, and worked outside mostly, in the yard and around the grounds. Even worked at the truck stop. I worked in the kitchen at the truck stop. Even as a little girl, I helped my dad clean parts because he was a mechanic. Just about everything you could think of you could do as a child in that environment, we did.” (Resident, Cimarron County, OK)

In some cases, however, women are restricted from helping out with agricultural-related chores and are limited to household duties because of gender norms.

“If he was building fence with my dad and my brothers or something, well, Grandma, I’d be helping her cook if they didn’t want to me to build fence. I liked to go do stuff like that rather than to cook, but sometimes they thought I needed to stay at the house and help Grandma. She thought I needed to, too.” (Resident, Cimarron County, OK)

Overall, these chores were crucial for the overall success of their business and were oriented around accommodating both adults' and children's schedules. There are, however, differences between households in which operational sizes and the varying effects of socioecological disruptions necessitate labor redistribution.

While chores were a family endeavor, women reported taking care of daily duties while also maintaining the household. This can vary across experiences, often due to the size of the operation or the pressures of socioecological disruptions. Several women recollect growing up in

agricultural households and highlight their mothers' responsibilities in overall production. Many women and their mothers “help out” their spouse with the operations but do not always have agency in decision-making or management of production. Some have minimal involvement in production, while others invest significant time and labor. One participant aptly captures this difference:

“Mama mostly dealt with the housework and things like that, besides doing her—she raised a huge garden and did that, and lots of chickens. That was Mama’s job. Milking cows and separating the milk and cream with the separator. That was her work. That was different. [My husband’s] mom was a cowgirl. She took care of the cattle and did everything else, too!” (Resident, Cimarron County, OK)

Many of these stories date back to the 1920s through the late 1960s. Overall, women in the oral histories detail intimate experiences with agriculture from a very young age.

Other responsibilities for women, particularly on ranching operations, include feeding crews for branding events. Branding events often involve a large family or community gathering to brand cattle. Women report that they, their mothers, or both are responsible for cooking large meals to feed branding crews. On the gendered divisions of labor, one woman states that “On branding day, usually all of the men came, and the women came and helped prepare the meals. It was sort of a play day. The kids had fun.” (Resident, Union County, NM).

These meals ensure successful branding events while also serving as a method of compensating those who come in to help. Thus, women are not only crucial for the success of branding events but also key to maintaining community relationships for trading labor amongst producers in the area. However, such types of labor and informal labor exchange are often unrecognized by policy makers and government agencies as women’s participation in agriculture.

From early childhood to adulthood, women are involved in agriculture, yet their contributions may not be formally recognized as those of producers.

Transitions and Difficulties in Decision-Making

When chores and responsibilities are structured by gender, knowledge and experience in agricultural decision-making can be limited, introducing a new learning curve for production. Experiences with daily duties, like feeding, milking, or checking for rain, differ from making management decisions, such as determining ideal times to sell cattle, hiring and managing labor, or managing and documenting the entire production. As noted previously, many independent female producers are widowed or divorced. In these cases, transitioning to an independent producer comes with new responsibilities and hurdles. In one participant's experience:

“Sometimes if we went to another ranch, I'd be back in the back, pushing the cattle out or something like that. Well, my husband was up there counting. It's hard for me to learn I've got to go up there and count because I need to know how many's in this pasture and how many's in that pasture. A man told my daughter and I both one time, (we was just kind of hanging back and waiting for a man to do that) he said, “You girls get up here. This is your job now. You've got to know that.” He was kind of firm with us, but he was right. It's hard when you haven't been used to doing that and being dependent on someone else to do it to start doing it after you're sixty years old. To me that was hard, and a lot of the meetings that you go to, you think, “I'm going to be the only woman there.” Once in a while now, there will be other women. We depended on our husbands to go to that and take care of it.”
(Resident, Union County, NM)

Some cases note that sudden losses of male spouses impose greater challenges for women who were not as involved in agricultural production. The knowledge and experience required for agriculture is immense, and historical gendered labor structures can often limit women's engagement with other necessary agricultural duties, such as baling, roping, or counting livestock, where some have experience, and others have very little.

In addition to labor shifts, managing production poses challenges for many women. Decision-making spaces in agricultural production in the earlier years of the stories shared in the oral histories tend to be male-dominated. Thus, when widowed or divorced women take over operations, decision-making spaces introduce a new vulnerability for women who may lack experience with this type of agricultural management.

“You know what one of my biggest challenges was/is I had never, ever made all the decisions. He raised me how he wanted me, I guess. (Laughs) Anyhow, he made the decisions. The only decisions I’d ever made was what to cook for a meal or to buy clothes for myself or the kids or whatever. Even furniture and stuff, he’d go buy furniture and stuff like that. That was the biggest thing was whenever it come time to do something, to make the command decision of, and it took me a long time to learn to do that. It cost me money because sometimes I should’ve made the decision to do it, and I was afraid I was going to mess up. That was one of the hardest obstacles.” (Resident, Union County, NM)

Due to the lack of access to decision-making spaces, women are often left vulnerable and insecure to the variability of socioecological disruptions. Where male producers tend to have more experience with agriculture, often through trial and error, women start anew, lacking the intimate knowledge of previous experiences and successes, as well as access to the knowledge-sharing spaces that are typically dominated by men.

The most significant challenge for women is the transition of labor and decision-making. Women’s descriptions of transitioning to primary or expanded producer roles and responsibilities indicate new opportunities yet also impose significant restraints. Many enter these roles with little training or exposure to key decision-making processes, creating new learning curves in labor management, financial decision-making, and navigating long-term economic variability. The gendered divisions of labor seen in earlier histories of adulthood often created new vulnerabilities for women with stressful experiences to acquire and learn new skills under intensified conditions.

Yet women maintain resilient attitudes towards agriculture, as they love it and want to continue despite the difficult and gendered experiences of production.

Technological Barriers to Participation

Agriculture is a rapidly changing business. New technologies are introduced frequently, including electricity, improved farming equipment, more efficient irrigation systems for both production and household use, improved meteorological data, genetically modified crops or livestock, among others. Many of these advancements are perceived positively as they can stabilize profits and production or make overall agricultural labor less intensive. Keeping up with new technologies or management methods is “just an ongoing education” (Resident, Union County, NM). Women often suggest that these new changes make agriculture more challenging due to their effects on producers' competition to meet market demands or by imposing yet another series of learning curves.

In general, the introduction of new technologies is perceived positively, but with a hefty cost. These technologies restructure production systems, usually leading to more convenience or requiring less labor. One female rancher comments on the changes in the improved methods of transportation for cattle:

“It changed in the way that you didn’t deliver your cattle like you did. The trucks come in, and they hauled them to the sale or your buyer or wherever. That was a lot more convenient than anything else. Probably the help, and that has changed ranching a lot.” (Resident, Cimarron County, OK)

While helpful, keeping up with technological advancements can be pricey, due to market pressures that force producers to compete for more land and water resources, as well as the general cost of equipment. Additionally, to justify operations and keep up with increasing national and global

market demands for agricultural commodities, having larger operations on more land requires more efficient methods for maintaining them without requiring more labor.

“Yeah, the technology in farming and ranching both is just, has exploded. It takes more acres. I think every decade it takes more acres to make a living. The profitability is less. It gets less all the time. What you used to could make on a hundred acres is taking five hundred acres to make that same profit because the expense of the equipment, and the price of the crop is not that different.” (Resident, Union County, NM)

Thus, while new technologies can enhance current operations, they can also add new layers of barriers to women's success in agriculture. Barriers can include higher upfront costs for land, livestock, crops, and equipment as well as intensified competition among producers, and additional pressure on already scarce environmental resources, necessitating increased access to funds and credit. Overall, access to equipment can limit participation in agriculture, where inherited equipment makes getting started or managing operations substantially easier. The prices of crops or cattle may not cover the cost of purchasing or accessing new equipment or technologies. Unlike male producers in many earlier histories, women may be more vulnerable to competition from more efficient, profitable farms with fewer operational disruptions, making it more difficult to maintain operations without similar long-term investments. Technology can serve as an enhancement of current conditions or as a barrier that intensifies present difficulties for agriculturalists in the area.

4.2.1.4 Institutional

Institutions are discussed in 15.52% of the coded references in the oral histories. In the study area, institutions are deeply intertwined with individual and rural community livelihoods. Institutions in this region included government, educational systems, financial institutions, and religious organizations and spaces. Producers in the study area often access institutional resources to fund production during times of stress. While not limited to women, supplemental funding from

federal and state institutions is often used by producers to both cope with drought and buy land or livestock for early operations. Women are also often found holding positions in educational, medical, or federal institutions. The following section covers the emergent themes of supplemental financial funding, leadership and representation in institutions, and the limited support for rural institutions (Table 7).

Supplemental Financial Funding

Supplemental funding, either through federal subsidies or personal financial instruments such as insurance policies or loans, is often used by producers in the Southern Great Plains. These economic resources have become critical for producers to maintain their operations and survive harsh environmental or economic conditions. Insurance includes both agricultural insurance for crops or livestock and more personal insurance, like medical. Each comes with its own set of experiences, yet most participants view federal financial assistance positively and recognize the importance of these supplemental resources.

Federal farm programs aim to provide financial stability to producers, either through commodity support, disaster subsidies for environmental hazards, or incentives to conserve environmental resources and sensitive lands. The length of these funds varies, with some as little as a year and others spanning 10 or more years. These government programs have been crucial for many in overcoming drought conditions or economic downturns that limit profits. However, these programs can also increase competition among producers seeking them, and the funds they provide may prioritize larger operations or those with greater needs. For instance, larger operations receive greater benefits than smaller ones, increasing competition for access to these funds and land. The effects of these funds, like much of agricultural operations, are gradual.

“I guess the last, probably, fifteen years. It was a gradual change. Part of it had to do with the farm program. The farm program, the more land you farmed, the better your benefits was. Then the ranching, it started in with big, big ranchers buying up the neighbors’ small ranches, so some of the ranches are huge now.” (Resident, Union County, NM)

Some women say that the funds awarded were beneficial but not enough to fully cope with socioecological disruptions, necessitating diversification of supplemental funding sources.

Loans and insurance policies are often used by producers to help ensure the longevity of their livelihoods. Crop insurance, livestock insurance, deeds, bonds, or loans (either federal or from other financial institutions) are discussed in the oral histories as a way to “borrow some money and hang on” (Resident, Union County, NM). Additionally, in many cases, insurance helps future generations maintain, inherit, and pay off land. One female producer discusses the benefits of insurance in the late 1940s:

“He left a insurance policy for a thousand dollars, and my folks paid off that place with that thousand dollars. He had left money—he had left another policy that gave my folks both twenty-five dollars a month, which at that time was pretty good.” (Resident, Cimarron County, OK)

Other types of insurance, such as home or medical care, for instance, often have to be purchased outright, imposing further financial strain, particularly for newer generations. The investments required for agriculture make the business more expensive to engage in over time.

“Everything has changed where you young kids aren’t going to make it because you have to have insurance for this, insurance for that, which we didn’t when we first started making a living. Now you have to have insurance for everything. You have to have car insurance. You have to have health insurance. You have to have insurance if somebody falls at your house, which I don’t have.” (Resident, Union County, NM)

Thus, in joint operations, many women undertake off-operation jobs that provide additional personal insurance or stable incomes to adjust to rising prices of environmental resources and to build personal and/or household safety nets. In agricultural households across the oral histories,

women's labor is diverse, bridging agricultural duties and professional duties at their jobs in town. Many of these positions are held in institutional spaces.

Leadership and Representation

Important institutions in the study area include post offices, schools, medical facilities, and churches, many of which women held positions. Thus, women's early engagement with institutions preserved both household and community livelihoods by bolstering overall resilience. Their engagement maintained integral institutions for small towns as well as diversifying household skillsets and incomes.

In the oral histories, 36.84% of women pursued higher education in nursing, business, or education, often returning to rural communities to find employment in these fields. Most oral histories report that educators tend to be women, with few cases of male educators. Early in settler histories, individuals were less likely to attend college as they were already financially struggling and could not afford it. Many who grew up during and after the Dust Bowl in the 1930s developed skills outside agriculture because they had the necessary capital or were able to better access scholarships and loans. One participant captures these trends:

“A lot of ranching wives or farmers' wives, it's more commuting now. They go in and can come back to the area and be a teacher or a nurse or whatever because they have a nursing program and teachers.” (Resident, Cimarron County, OK)

Due to the environmental and economic variability of agriculture, holding these positions in institutions became very valuable. Rural education systems are built by communities, and women often held positions as teachers, superintendents, or school nurses.

“In the little church. Mother said that her parents, her mother and stepfather, helped build the little church. They were extremely active in the church. My grandmother was the

Sunday school superintendent, and she sang beautifully, I guess... I think her mother was extremely active in the church, as I understood.” (Resident, Cimarron County, OK)

Their value, however, changes over time depending on federal and state support for these institutions. In some cases, the value for institutional positions, such as educators, may be higher:

“[I got] my college education and came back to [Union County], not planning to teach. Well, I planned to teach music. I had majored in piano and speech, so I came back to [Union County], planning to teach piano and speech classes. That was just at the end of the war, of World War II, and teachers were at a premium.” (Resident, Union County, NM)

In other cases, low government support for these institutions leads to either more investment from community members or to access to similar occupations in other counties or even states. In both counties, for instance, state-level support for small-town educational systems greatly affected women’s occupations and additional income sources. Education had been “the largest payroll in town” (Resident, Union County). Overall, limited support for rural institutions creates further vulnerabilities for small agricultural communities in these two counties.

Limited Support for Rural Institutions

Out of the numerous institutions, schools and medical facilities tend to be the most vulnerable in the study area. Schools in the two areas are frequently under threat, as lower populations mean fewer enrolled students, often leading to closures. Additionally, in both states, educator pay is often very low. Several women report finding jobs in other education systems in different counties or even states. The following participant’s story reflects numerous women’s experiences in education across the oral histories:

“Well, I went to Texas because they paid better. I was teaching in [Cimarron County] for not very much money, and I increased my wages by 25 percent by going to Texas.” (Resident, Cimarron County, OK)

Limited support for rural education systems discourages many from staying in the area. Declining support for rural education posed significant challenges for agricultural communities in the two counties.

Reduced funding for facilities and jobs, school consolidations or closures, and limited educational resources negatively affect both the community and agricultural livelihoods. These effects largely impact women, who maintain positions in these institutions. One participant highlights the continuous struggles to keep the school open:

“I graduated in ’41, and they were not consolidated then. I’m going to say the late, maybe around 1950 that they really began consolidating because when I started teaching, we had lots of buses still coming and bringing the kids. When we consolidated, we had even more buses coming in, but it would’ve been the late ’40s or early ’50s when that began to happen. Then as each little school, as their student population got smaller, then they had to bring them to town because, you know, they couldn’t provide enough teachers to give them everything that they needed in these small schools.” (Resident, Union County, NM)

Schools are critical institutions that anchor communities. Additionally, many schools have agricultural-related programs for students, including 4-H or Future Farmers of America programs and groups that are important for younger populations interested in staying or getting into agriculture. However, disinvestment in rural schools often leads to community initiatives to keep them open, either by crowdfunding money or by restructuring household systems to accommodate more distant schools.

Medical facilities are also notably in decline in both counties. Similar to schools, participants report seeking medical care in distant counties or states because healthcare in town may not meet their needs. Present healthcare facilities have either decreased the provided services or become obsolete. Having a good hospital is one incentive for people to stay in communities. In

topics targeted at the population trends in future generations, one participant captures this need for adequate healthcare:

“Next generation? My children will probably be where there is a hospital. We have a hospital here, but one of them is going to be a heart hospital. They probably won’t come back here unless they come back as a part of No Man’s Land to work here, which one of them wants to be.” (Resident, Cimarron County, OK)

Not only are these institutions necessary for job opportunities and livelihoods, but they are also crucial for community cohesiveness and identity. Reliance on federal or state support for these institutions is not seen as a viable option. Instead, women in the oral histories discuss community-led projects to keep institutions alive.

4.2.1.5 Community

Community, as an SES component, can bridge multiple facets of SES, especially in rural communities where components are deeply intertwined. Community in the oral histories was identified as the social networks, group initiatives, identity, and population dynamics found in the two counties. Amongst all SES components, community was the most discussed, comprising 24.79% of the coded references. In what follows, the struggles of rural agricultural communities are highlighted through the emergent themes of women’s informal labor in fostering community identity and resilience as well as the trends of outmigration and subsequent community restructuring (Table 7).

Informal and Formal Community Leadership and Fostering Community Identity

Women in the oral histories share their own stories or those of their mothers, who held informal and formal community leadership positions. This can include clubs, groups, or organizations that are either based in or expanded from institutions. Some group initiatives are undertaken during periods of extreme socioecological distress, like the Red Cross during the Great

Depression, or persist over time like the women's Extension groups, adapting to new challenges. Groups such as rotary clubs, Extension groups through land grant universities, 4-H programs, and Vacation Bible Schools, among others, invest in community resilience and future generations. These groups are largely made up of women, taking leadership roles and initiative to improve community livelihoods and, in turn, foster community cohesiveness.

The women's Extension groups were particularly important for engaging communities with each other. In the study area, women consistently sustain Extension groups during periods of hardship and often take the primary responsibility for maintaining participation, organization, and longevity of the groups. Extension programs in the study area are led by local county agents, and (in)formal women's Extension groups, specifically emerged to adapt the programs and resources that better meet the needs of people in the area. In these groups, women express the importance of educational opportunities centered on homemaking activities like canning, crafting, sewing, among others that have built long term relationships amongst women. Importantly, these Extension groups have persisted throughout limited or lacking support because of women's investment and informal leadership in these spaces. One participant shares her experience with the Extension:

“They worked with rural people because at that time, people were at home and the homemakers. That's why there were so many clubs because each had all these communities that met on... She incorporated me into the adult clubs, as well as doing the 4-H Clubs, and, of course, we helped each other. That was the purpose. I mean, when they put the 4-H agents in, then you picked up the 4-H program that the adult agent had been doing. They become strictly the women's club or the ag, and then we picked up the 4-H. All four agents worked together, and we had big clubs. At one time there was over three hundred women involved in Extension clubs.” (Resident, Union County, NM)

Despite varying distances to town hubs and meeting centers, many women strive to participate in these groups to foster strong social networks. Extension groups often focus on providing and sustaining educational opportunities and spaces for women and girls.

Religious groups are very important in both counties. In general, the church serves as an important institution for communities, helping develop and foster community identity. Participation in Sunday church services used to be predominantly women and children, while men often needed to stay on the operations. In later years, this has changed:

“The church was real active. One thing that has changed about the church that’s been wonderful, when we first come here, there was only one man going to church. The rest of it was either widow women or women with children. There was men that was active in the church. They sat on the board, and they were active, but they didn’t go regularly. Now, then, we have a whole church full of young men and daddies and kids. That’s been wonderful to see that evolve over the years. You have to understand that men in this area, they have cattle to feed and things to do on Sunday morning. I have enjoyed that part about the church, to see it evolve from the way it was when we first come to what it is now.”
(Resident, Union County, NM)

Several women report being involved in summer church programs for younger populations, including providing accommodations, lessons, and activities. These religious groups are key pieces of community identity in the study area that are often fostered by women and women leaders.

Additionally, these spaces often serve as places for women to share knowledge about successful or unsuccessful adaptations and skills. The Extension club in particular is oriented to provide lessons and skills for women living in the area, such as canning, sewing, candle-making, flower-making, cooking, among others. The 4-H groups encourage further participation and education in agriculture for younger students. Many women are 4-H leaders. These Extension groups are often maintained in several generations, as the programs aim to educate while also developing camaraderie amongst group members. However, population changes because of the harsh impacts of socioecological disruptions lead to an increase in outmigration that restructures communities.

Outmigration and community restructuring

Due to limited economic opportunities and a lack of state support for institutions in these rural agricultural communities, participants report a population decline. Communities in the two counties are characterized by aging populations. Some women suggest that younger people leave their communities to pursue higher education and seek better opportunities elsewhere. Many others suggest that families and younger populations tend not to come back because there are few to no opportunities. Two examples from each county highlight these changes and effects:

“That’s another reason our population has declined. We don’t have anything to offer new families, and particularly the kids who graduate from college. They want to come home to do something, but the opportunity just isn’t there. They can’t. It’s just a very friendly community, and people help each other. It’s just a little small-town atmosphere. Well, it is a small town, but you have that feeling of closeness.” (Agriculturalist, Union County)

and

“I see a lot of vacant buildings, farmhouses and all, and that’s sad. The kids nowadays can’t come back because there’s nothing for them to do. We’ve got to get something for our young people to want to come home to, but we do have some families that are moving back.” (Resident, Cimarron County, OK)

Limited land availability for small-scale operations and sparse economic opportunities in town heavily affect communities’ ability to cope and adapt to socioecological disruptions. Previously, cohesive community identities and social networks ensured stability. People could depend on their community to support one another, but in later years this support system is threatened. The effects of these changes impact SES on smaller scales, such as intrahouseholds, that permeate multiscalar systems and components.

4.2.1.6 Intrahouseholds

Intrahouseholds, or production systems and decision-making systems in households, are the least discussed SES component among the oral histories, accounting for 9.53% of the coded references. Yet discussions of intrahousehold dynamics provide poignant insights into the experiences of women in rural agricultural communities. Intrahousehold environments in many of the oral histories are structured by gender, including roles, responsibilities, and access to agency in decision-making. The dynamics and structures of intrahouseholds are discussed through the emergent themes of intergenerational resilience and agency in intrahousehold decision-making and responsibilities (Table 7).

Intergenerational Resilience

Intrahouseholds tend to be managed by women. The household labor and responsibilities are often placed on women due to historical gender norms. Women's accounts share their own or their mother's central role in maintaining intrahousehold resilience through the daily management of environmental, economic, and household demands. In many cases, intrahousehold strategies for overcoming socioecological disruptions are passed down through generations.

Strategies developed during the Dust Bowl and Great Depression, for instance, included conservative attitudes towards resource management in anticipation of socioecological disruptions that could limit or prohibit travel. One participant, who did not grow up in a rural agricultural community, shares this experience:

“Well, yeah...[My mother in law] told me, “You need to have your freezer stocked.” She always has a really stocked freezer. She has three freezers stocked all the time, even for us when we first came. I just said, “Well, it’s just the two of us and a small child. What all can we eat and how long can it be before we have to—we can go to town again?” We really haven’t had a major experience like that, but I do tend to stock a lot more food than I could ever possibly think that we would need in a short amount of time or through the winter.” (Resident, Union County, NM)

Women also have unique knowledge-sharing spaces, like the Extension groups and clubs, for intrahousehold management. Much of what is learned in Extension groups, for instance, is applied in households, either for personal use or, sometimes, for profit in local economies. Sewing and canning are necessary skills for living in the two counties, as access to grocery stores and the ability to keep food for long periods until the next trip to town can be unpredictable. Most often, participants report needing to be conservative and self-reliant, employing and learning skills to respond to environmental and economic instability:

“Yeah, they just didn’t spend all their money. Like I said, my mom made all of our clothes. I can remember my dad wearing jeans that were patched from here to here, patches on top of patches on top of patches.” (Resident, Union County, NM)

This self-reliance also entails gendered environmental knowledge. This includes women’s household land use for gardens, milk, and chickens, as it was important to both raise livestock and can food in this area. In cases where women maintained small-scale land use, the environmental knowledge oriented around coping with drought is often oriented from the perspective of the household in the interest of longevity and quality of these resources.

The oral histories aimed to collect stories from Dust Bowl survivors; many interviewees shared how their mothers or they adapted to dusty, dry conditions. The Dust Bowl and later droughts posed respiratory health threats from dusty winds, prompting measures such as hanging wet sheets over windows and door frames, insulating house openings, increasing cleaning of household spaces, protecting food and water resources, and using mouth coverings to reduce inhalation. For instance, one participant recollects using these techniques developed by women in later droughts:

“Oh, yeah. When my oldest child was a baby in 1950 (he was born in ’50), I can remember wetting the sheets and hanging them over the windows in the room where he was sleeping

to cut down on the dust, which is what they had done in the '30s.” (Resident, Union County, NM)

Beyond maintaining clean conditions, women actively adapted household spaces and routines to reduce exposure and sustain healthy living conditions. Outside of agriculture, their stories highlight how environmental stress is also mediated through household labor, in which managing gardens and coping with drought-related health hazards becomes a crucial yet often unrecognized form of resilience. For instance, the following quote exemplifies this when choosing land to settle and operate on:

“When we lived in Colorado, that water was terrible, and we had to haul water to drink and cook with. I remembered that experience. He come home that night, and he said, “I don’t know... but I think Dad’s going to buy that place.” I said, “Well, what’s it like?” He said, “I think it’s going to be all right.” I said, “What about the water?” He said, “Oh, it’s got plenty of water. It’s got some live water on it.” I said, “Well, what does it taste like?” He said, “I don’t know what it tastes like!” I said, “Did you go in the house and get a drink?” He said, “We went in there, but I never thought about drinking any water.” (Resident, Cimarron County, OK)

Drought not only affects agricultural operations, but it can also simultaneously impose health concerns or exacerbate household conditions. Many women who were not directly involved in agricultural operations experienced drought from the household perspective, creating broad gendered knowledge systems among women on how to cope with harsh conditions. These practices reflect adaptive strategies rooted in experience and foresight, recognizing the ongoing yet often invisible adjustments necessary to maintain a stable household environment in an unstable climate.

Intrahousehold agency in decision-making and responsibilities

In an agricultural household, labor divisions amongst family members can be very broad, where agriculture itself is a “family affair” (Resident, Union County). Often, labor is highly gendered, whereas in other households, agricultural and household labor systems tend to be

intermixed. Yet, overall, whether women are heavily involved in agricultural labor or not, women's invisible labor in agricultural production is grouped with intrahousehold responsibilities.

Much of this balancing of household and agricultural labor starts for women from early childhood. The following quote reflects most of the stories shared by the women in the oral histories:

“Well, my main chore was rather than doing housework, I had to wash the cream separator. It had to be washed every day because that's what we did. Daddy milked cows and sold cream, and we had hogs that he fed the rest of the milk to. I had to help with the—I never did have to help with the milking very much. I was still too young for that. I helped sometimes during the hay season to push wires through the hay baler. It was much different than it is now. My daughter and her husband have a mega hay deal, but we had to have somebody pushing the wire through and somebody driving the tractor. It took the whole family.” (Resident, Union County, NM)

In other households, though, divisions of household and agricultural labor were highly gendered.

As one woman explains:

“It was very male-female dominated. The men worked in the field, was always out, and we girls stayed and helped Mom with the cooking and the cleaning. I just remember the guys were very prompt, always really good about coming in at twelve o'clock. The three of us girls and Mom would cook and get everything ready, the table was set, and we wouldn't make glasses until Mom heard the pickup. She said, “Here they come!” We'd race in, and we'd throw the ice in there because it'd melt otherwise. We threw ice in the tea glasses and had the tea and everything on the table. When the guys came in, they could just sit and eat and go because they were busy. I am number five out of the six, so as they graduated and left, poor Dad had to finally put me on a one-way. I had to be the son after everybody else left me and my little brother because we just ran out of hands.” (Resident, Union County, NM)

Women's contributions to agriculture are often described as helping out, rather than core labor to the overall production. Particularly during socioecological disruptions, women were expected to handle both household responsibilities and agricultural tasks that may be invisible in institutional

data collection methods. One woman comments on this distinction, suggesting that even small-scale farming or ranching is still agriculture.

“Yeah, every ranch, the women worked, gardening, whatever came...Our neighbor, she raised turkeys, two or three hundred turkeys. That’s ranching. You don’t have a—Sunday is a day’s work just like another day because the animals have to be fed.” (Resident, Union County, NM)

However, decision-making spaces were not as fluid. In many of the oral histories, the men in families were responsible for making household and management decisions. Thus, when women transition to having more of an independent and leading role that takes on more agricultural responsibilities, it is very difficult. Additionally, it can be difficult for many women to be expected to take care of household responsibilities and agricultural responsibilities, or having to learn new skills suddenly when spouses divorce, when women are widowed, or when boys leave families, necessitating responsibility changes:

“Well, yes. ... I was protected all of my life. My father, had a really good father. He did everything for us that he should have. I’m thankful that he taught me how to do some things in the field, and ride, and things like that. It is different because you feel like, for instance, when it’s time to brand, it’s the man’s job. It was my husband’s job to go and tell each man what he would like for him to do and what part of the pasture he wanted them to gather. That was really hard for me. I did not feel like I could tell those men what to do, and different people kept explaining to me, “That’s your job now. You’ve got to tell them what you want them to do.” I have two daughters, and both of them were a really great help because they would tell me before we were going to brand, “Now, Mom, think about who you want to do certain jobs.”” (Resident, Cimarron County, OK)

These changes in decision-making roles in the household also extend to managing economic resources. Many women in the oral histories report that they are often in charge of managing the finances, but agency in using economic resources tends to be more male-dominated. One participant aptly explains her experience:

“You know what one of my biggest challenges was / is I had never, ever made all the decisions. He raised me how he wanted me, I guess. (Laughs) Anyhow, he made the decisions. The only decisions I’d ever made was what to cook for a meal or to buy clothes for myself or the kids or whatever. Even furniture and stuff, he’d go buy furniture and stuff like that. That was the biggest thing was whenever it come time to do something, to make the command decision of, and it took me a long time to learn to do that. It cost me money because sometimes I should’ve made the decision to do it, and I was afraid I was going to mess up. That was one of the hardest obstacles. Then, you know, I had 700 acres of farmland.” (Resident, Union County, NM)

Thus, while intrahousehold matters tend to be within women's purview, decision-making opportunities can be very limited, creating another barrier to adjusting and learning new skills. Yet women, despite these difficulties, have successfully overcome them.

The oral histories intimately engage with the lived experiences of women in rural agricultural communities in the study area. Shared histories and themes are connected between counties and individuals that explain the uniquely gendered disparities that women face. Additionally, the oral histories span a longer time range than the USDA Agricultural Census reports, predating them by over 50 years. The key informant interviews, conducted ten years after the oral histories, provide a broader and more current community perspective on women in agriculture and the structural challenges facing rural agricultural communities.

4.3 Coding results from Key Informant Interviews

The coding results of the key informant interviews identify broad community perspectives of women in rural agricultural communities and further address question two, as well as answer question three. Across key informant interviews, participants share their perceptions and personal experiences with socioecological disruptions and current SES conditions in the Southern Great Plains. Additionally, the key informant interviews aim to expand on the oral histories, which are

the core of this project. These emergent themes bridge FPE and SES to unveil the structure and effects of gender in rural agricultural communities.

4.3.1 Trends in Key Informant Interviews Coding

The key informant interviews highlight many of the barriers, opportunities, and continued resilience work from women. Across 169 pages of descriptive notes, a total of 4,171 observations were made. Production (21.75%) and institutional (20.55%) are the most discussed. Unlike the oral histories, community (18.82%) is the third most coded SES-FPE code, where community was the first in the oral histories. Economic (17.12%) closely follows as the fourth most coded. Environment (14.84%) ranks fifth out of all codes. Similar to the oral histories, intrahouseholds (6.93%) were discussed the least out of the FPE-SES components (Table 8).

Within the SES components, emergent themes and topics from the oral histories served as key indicators of women's experiences in rural agricultural SES in the two counties. The emergent themes encompass topics related to the early Dust Bowl days and the period during which the oral histories were conducted in 2015-2016. Many overlaps exist between emergent themes between SES components, which are addressed in the following sections. Emergent themes from each FPE-SES component serve as points of comparison and evidence of women's experiences in rural agricultural SES in the study area. The themes address current perceptions, rather than the longer time scales of the oral histories (Table 8). Overlaps exist among themes addressed in the following subsections, yet each has distinct properties that tie it to one FPE-SES component over another.

Table 8: Statistics from qualitative coding of the key informant interviews by converged SES and FPE component.

SES-FPE Component	Reference Count (%)	Emergent Theme
Environment	785 (14.84)	• Familial/generational land access and barriers to accessing land • Adaptations to environmental impacts and changes • Household land use
Economic	714 (17.12)	• Market pressures and variability as a barrier • Off-operation occupations necessary • Declining engagement with local economies
Production	907 (21.75)	• Perceptions of women in agriculture • Resilient attitudes towards agriculture • Technology as an entry point
Institutional	857 (20.55)	• Limitations of institutional access and funding • Leadership and representation • Educational pathways to agriculture
Community	785 (18.82)	• Informal community leadership fostering community identity for resilience • Generational shifts in community participation • Intersecting SES strains in the community
Intrahousehold	289 (6.93)	• Balancing household, economic, and agricultural resilience • Team/joint resilience strategies
Total References	4,171	

The emergent themes focus on women's experiences with each SES component (Table 8). The following subsections address question two and its sub-questions of this project by exploring the gendered narratives of women in rural agricultural communities, with a focus on the barriers and disparities they face. Barriers and entry points to participation, as well as strategies for SES resilience, are explored with excerpts from interviews.

4.3.1.1 Environment

Coded references for the environment SES-FPE component accounted for 14.84% of the key informant interviews. Emergent themes parallel the oral histories in some ways, yet vary in others (Tables 7 and 8). Environmental resources, particularly land and livestock, are discussed,

as are the ways in which they are accessed. Emergent themes include familial and generational lands as a barrier to access, adaptations to environmental impacts and changes, and barriers to accessing land broadly (Table 8).

Familial/Generational Land Access and Barriers to Accessing Land

Similar to the oral histories, familial and generational land access is the most common way women obtain land. Several women in the key informant interviews report that they themselves or others they know inherit land from their families or through marriage, and that the husband and wife run the operations together. Thus, these generational operations continue. An agriculturalist and entrepreneur from Cimarron County recollects her family's history on the land they now own, which was passed down from her father-in-law and will later be passed down to their kids, suggesting, “that’s the way it should be” (Resident, Cimarron County, OK). Most lands are ensured in wills or trusts. Yet, when explaining the histories of the land, participants attribute original ownership and succession to the family's male line, with female ownership of generational land being relatively new. Additionally, many suggested that women who have directly inherited land obtain it through divorce or as widows. In both counties, participants are able to think of several examples of widowed or divorced women continuing operations.

In general, participants report that without having access to family lands, accessing land is nearly impossible. Both land and cattle are more expensive than in previous years, creating another barrier to new agriculturalists starting out. To get started, you have to “know somebody” to be able to access land because of the price, but also because communities tend to want to keep land in the community (Resident, Cimarron County, OK). One difference from the oral histories is that fewer families are leaving because of the climatic conditions, but rather the expense of keeping generational lands. Most land is being consolidated into bigger farms or bought by out-of-town

buyers. A resident from Union County comments on this trend and states that “local folks can’t survive” because of these patterns.

Adaptations to Environmental Impacts and Changes

The effects of cyclical drought instilled cautious adaptive strategies for managing and conserving environmental resources. Additionally, this also means adjusting where and what resources to access. Several participants suggested that harsh climatic conditions force you to “just adjust” or adapt, either by restructuring production schedules for that year or by accessing different water sources (Resident, Cimarron County, OK). At the time the interviews were conducted in the summer of 2025, all participants commented that it was a particularly wet year. A community leader from Union County suggested that wet years generally occur in years ending in 5 or 7. Furthermore, on the topic of drought, a financial advisor in Cimarron County emphasizes that drought is ever-present and that “it’s not if drought happens, it’s when,” noting that anticipating when and the intensity of drought is a consideration most producers must take.

In the same strain of conversations, participants recognize the variability of climatic conditions. Adaptations to climatic conditions tend to be similar, and overall adaptations, such as center-pivot irrigation that taps into groundwater, using more feed when grass is sparse, or the cultivation of less water-intensive crops, continue. Another adaptation mentioned in the key informant interviews is choosing livestock that is “acclimated to a rocky [or dry] environment at the ranches” (Resident, Cimarron County, OK). Yet, most participants recognize there are “some things you can’t change” as nature takes its own course (Resident, Cimarron County, OK).

Household Land Use

Many women reported having small plots of land for gardens and livestock, such as chickens, alpacas, goats, and pigs. Although cases of women having gardens or small-scale agriculture seem less common than in the oral histories. Rather, women's increasing involvement in bigger agricultural productions takes precedence. Those who do have land for household purposes report that caring for the gardens and livestock is therapeutic and a personal endeavor. Many women still can and do consume the products, but more for convenience and pleasure, saving them a trip to town to buy milk and eggs, for instance. A business owner from Union County reported that she sometimes used vegetables from her garden at her business. Largely, these household land uses stem from traditions passed down by women instead of necessity.

4.3.1.2 Economic

Changing market conditions and income opportunities are seen in the key informant interviews. Overall, economic codes comprised 17.12% of the total observations. Themes cover market pressures and variability as a barrier, the need for off-operation occupations, and the declining engagement with local economies (Table 8). These themes are discussed in the following sections.

Market pressures and variability as a barrier

Land and livestock prices are a prominent economic theme. The cost of running a ranch has become significantly more expensive. Adaptations to these market pressures include selling off land or selling cattle to have a smaller herd to take care of. Particularly for ranchers, selling off cattle and maintaining a smaller herd is advantageous because when the land cannot provide enough grass, producers need to supplement with feed that is also increasing in price. For most

environmental resources, “rent and cattle are out of this world” and many participants reported that 2025 was a seller’s year for cattle, not a buyer’s year (Resident, Cimarron County, OK). Due to the extreme market pressures, many producers just must “find ways to get by” whether that means adapting production sizes or cutting costs in the household. This often means that producers have to reassess generational lands, and “at what cost” are you keeping them (Resident, Union County, NM).

Off-Operation Occupations Necessary

Many participants expressed a deep love for their agricultural livelihoods. However, as things become more expensive to run, more people are obtaining outside jobs to keep the operation going. Depending on what time of year and what the climate is like, agriculture can be a “crapshoot” where people find off-the-farm jobs to keep the operation going, for the extra income or benefits like health insurance (Resident, Cimarron County, OK). Typically, this packs women’s schedules where “sleep is optional” (Resident, Union County, NM). One woman aptly states that “you just have to keep your nose to the grindstone or you’re going to sink” and adapting with multiple jobs or diversifying labor (Resident, Cimarron County, OK). Without the outside income, managing an operation would be near impossible to be successful.

Declining Engagement with Local Economies

Communities in the study area strive to support local economies by buying resources or products in town. Women have been supporting the local economies for generations and one participant considers women to be very “dependable and reliable” in this regard (Resident, Union County, NM). Although skyrocketing prices often deter participation in local economies, forcing individuals to purchase products elsewhere. There are still significant investments in the

community, such as “branding, loading, and receiving... neighbors can call people for trading labor” and “buy commodities from locals” (Resident, Union County, NM). Two business owners in Cimarron County say they frequently buy products in Texas rather than in town because they are more affordable. There is also “not a lot to choose from” (Resident, Union County, NM). Additionally, following the COVID-19 pandemic, business owners, largely women, are still trying to recover and keep up with rising prices. One resident from Cimarron County suggests that “you really have to work at it” to make it in this community. Some community members invest in the community themselves. For instance, community members contribute to building projects for local amenities that attract outsider and local business (such as local historical museums) or donating to schools to combat the negative effects of a variable economic market as well as changing demographics.

4.3.1.3 Production

Agriculture is a rapidly changing business. Overall, production is the most coded SES-FPE component (21.75%). Many emergent themes in the key informant interviews diverge from the oral histories. In what follows, the emergent themes of the current perceptions of women in agriculture, resilient attitudes of women in agriculture, and technology as an entry point are examined (Table 8).

Perceptions of Women in Agriculture

Many participants think that women are getting more involved in agriculture and taking leading roles but typically have a history in agriculture. From one woman’s experiences, she had “no trouble with men accepting me” as an agriculturalist since she “grew up this way” (Resident, Cimarron County, OK). There’s “no shock factor when it’s a woman doing agriculture,” and in women’s involvement in major operational tasks (Resident, Union County, NM). Women have a

love for agriculture, and “they could do anything they wanted to,” but they stay in the business because they enjoy the lifestyle (Resident, Cimarron County, OK).

While women’s participation in agriculture is not contested, participants report that it remains gendered. When participants share this, they often refer to the divisions of labor. Many women say they help out when necessary or with the “bigger things”, whether that means putting a meal together for a branding event or helping gather cattle (Resident, Union County, NM). One resident from Union County notes that his wife’s meal for branding events “is just about as important,” if not more than the actual event. Another resident from Union County notes that, nationally, women are becoming more involved, but in the study area, men tend to be in charge of operations unless women have lost their spouses.

In many of the key informant interviews, women outline the labor structure of their operations. As in the oral histories, women are very involved in agricultural production even when they do not directly own it. This includes feeding cattle, checking cattle, breaking ice, managing windmills, driving the tractor, running parts, and many other responsibilities. Small family-owned agricultural operations continue to be very team-oriented, which many participants suggest is necessary. Several participants share that both spouses have full-time jobs, and in cases where only one has a full-time job they manage the operation in between breaks or before and after work. Even though social barriers are weakening and more opportunities for women in agriculture are emerging, hurdles still exist due to the impact of historical cultural norms.

Resilient Attitudes Towards Agriculture

Attitudes towards women in agriculture, particularly in leading operations, have begun to change. “If there’s a job to be filled, and you fill it, that’s great” (Resident, Union County, NM).

Yet, women reportedly have a “big job” when it comes to being in agriculture (Resident, Cimarron County, NM). When women take over and are in control, many participants suggest that women have to prove themselves more than men do. In particular, the generational knowledge that men possess in a historically male-dominated occupation means that women have to “play in a man’s world,” where they must restart the process of trial and error to implement adaptive strategies or business decisions later (Resident, Cimarron County, OK). One independent female agriculturalist from Cimarron County shares her story of being a woman in agriculture, where she feels the need to prove herself to others when conducting business, meaning keeping up appearances in town, even though ranching can be difficult and dirty. Another resident from Union County has been told, “Don’t tear up your body, you know, being a woman.” Sometimes it takes “putting your foot down” (Resident, Cimarron County, OK). Many women share the love for agriculture, even though in general it is a difficult and laborious occupation, and women just have to “go get it and go all in. Get your hands dirty in it” (Resident, Cimarron County, OK). Some widespread changes and technological innovations in agriculture are reported as avenues to make agriculture more accessible to women.

Technology as an Entry Point

Many new technologies have made managing agricultural operations easier, including air-conditioned tractors with GPS, computerized documentation, and larger, more efficient machines. One resident from Cimarron County notes that agriculture is “supposed to be hard,” but is thankful that her kids do not have to experience the same laborious hardships that she herself and the people before her did. Access to transportation like trucks or ATVs to check properties, electric chutes for cows, air conditioning and radios in tractors, and internet access to new cattle markets have made managing agricultural operations much easier. Newer technologies introduce new

opportunities for agriculturalists, where younger and new agriculturalists can “totally rethink” agriculture with a “wide-open mind” (Resident, Union County, NM). Institutional resources, however, can inhibit women’s opportunities in agriculture.

4.3.1.4 Institutional

Institutions are the second most coded SES-FPE component (20.55%). Many of the same institutions discussed in the oral histories are also discussed in the key informant interviews, yet participants highlight and emphasize new institutions. In particular, emergent themes of institutions included limitations in accessing institutions and funding, women’s leadership and representation within institutions, and educational pathways into agriculture (Table 8). Each emergent theme is explored in the following sections.

Limitations of Institutional Access and Funding

Several loans and programs are available to new and female agriculturalists. First-time farmer and rancher loans and first-time women's loans are most used to get individuals started. Generally, those who have been able to successfully access these loans have more positive outcomes. There are also loans for socially disadvantaged individuals; eligibility for this category is determined by federal entities. As land and cattle prices rise or as crop failures become more frequent, these institutional resources are necessary. However, several participants share that accessing these resources can be very difficult.

Producers reported that having deep roots within social networks with institutions and their offices is advantageous for either getting funding or knowing about the multitude of programs and funds to choose from. For instance, residents in both counties note that both men and women, or young agriculturalists and their parents, tend to come in to handle applications and forms. Some

applications for these programs and pools of money are considered a sort of lottery (Resident, Union County, NM). Beginning farmer and rancher loans, for example, have become more selective, with individuals starting out needing financial assistance. However, the first-time women's loan seems to have dissipated, as women are no longer considered a socially disadvantaged group, and specific federal resources for women are gone. This often means that women must greatly diversify their funding and loan pools to achieve the same goals. As one resident in Cimarron County shares, during hard times, she and her family "cinched our belts" and "lived very practical," but without access to bank loans and crop insurance, "you ain't going to make it." However, while women's avenues for accessing institutional funds for operations face many hurdles, women have also found access to agriculture through other means, where the composition of these institutions is often more inclusive of women.

Leadership and Representation

Most of the women in the key informant interviews are, or have held, positions in important institutions in the study area, either agricultural or civic. In financial institutions, many women manage applications, work with producers, handle certifications, issue insurance policies, or help document producers' operations. Notably, more women are in government positions, whereas previously these positions were predominantly held by men. Several participants noted that while women are more involved in government institutions, men tend to hold head or executive positions. In education or community spaces, however, women take leading roles.

In civic institutions, women are the main leaders and actors. Community leaders in each county often reside in important civic institutions, usually educational. Boards for civic institutions are made up of women, typically those who are "home-raised" or those who have been born and stayed in these communities (Resident, Union County, NM). Particularly for educational

institutions, having women employed in these institutions is beneficial, as they can balance the experiences of many students who have grown up in agriculture with a different curriculum from the state. These civic institutions are oriented toward serving as a “beacon and pillar for the community,” with women as key actors bolstering them (Resident, Cimarron County, OK). However, agricultural teachers are considered an “endangered species” (Resident, Cimarron County, OK). Education is an important means of engaging or introducing students to agriculture.

Educational Pathways to Agriculture

Education in each county is supported differently by families or the state. However, most teachers in these schools are women. Educational opportunities for girls interested in agriculture are available through many programs, such as 4-H and Future Farmers of America. Educators incentivize students to get involved in these programs and groups by incorporating them into the curriculum, allowing students to complete both school and program requirements. Involvement in these programs is relatively even between boys and girls. At the time of the interview, girls held most leadership positions in these groups. Some women reported that their children, who were or are involved in these programs, continue to want to pursue agriculture. Additionally, these programs offer opportunities beyond the community, whether within the broader state or at the national level, allowing students to develop a well-informed understanding of agriculture in the United States.

4.3.1.5 Community

Community spans broad facets of rural agricultural SES, many of which women are leaders. In the key informant interviews, community was coded in 18.82% of the total references. Topics and emergent themes cover informal community leadership that fosters community identity

and resilience, generational shifts in community participation, and the intersecting SES strains affecting these communities (Table 8).

Informal Community Leadership Fostering Community Identity for Resilience

In each county, women assume informal leadership roles in clubs or groups that aim to foster community resilience through cohesive identities and group events. In some cases, women use their positions in civic institutions or businesses as a network and a means for informal community gathering. Others are based purely on social networks. In Cimarron County, for instance, women have organized into age-stratified groups that take on responsibilities for community events, including community fairs, fundraising events, and memorials for deceased community members. These groups make their own schedules and set priorities based on what they think is important to the community. One woman from Cimarron County comments on attitudes towards community work, saying that “if you want to do something for the community, just do it” (Resident, Cimarron County, OK). In Union County, Extension groups have continued through environmental and economic hardships. Participants share that women’s Extension groups continue to persist, even if informally, and have oriented group meetings towards building community with lessons for practical life skills, such as taxes, wills, and testimonies. Women in these groups recognize that government funding for upkeep can be sparse, so they invest and rely on community members to do the same. In addition to overcoming financial hurdles, generational shifts in community participation in these groups have changed in recent years.

Generational Shifts in Community Participation

Communities in the study area have observed significant shifts in community participation, including outmigration, newcomers, and reduced participation overall. A resident in Union County

says that “people aren’t coming back,” which has greatly impacted the community, meaning that fewer people are around to pass down community or generational knowledge to. Businesses in both Cimarron and Union County are mostly run by women, who have reduced working capacity and business hours in response to declining participation in the community, despite these businesses being the “anchor” of these communities (Resident, Union County, NM). In both counties, participation in important institutions such as the church has declined sharply, either due to the disappearance of the rural family or to an aversion to women’s leadership roles. Participants in both counties report that the aging population of women is a potential reason for less community engagement, where older women’s groups fight to keep these groups but are often combatting busy agricultural schedules limiting trips to towns for group events. Large-scale processes or conditions also have effect on community engagement.

Intersecting SES Strains in the Community

Investments in local economies or institutions are linked to declining community engagement. Younger populations often do not return to communities because better opportunities exist elsewhere, and businesses and major employers are disappearing. The “expense of bringing things in” makes maintaining these businesses and institutions “too expensive” to rationalize (Resident, Union County, NM). Another resident in Cimarron County comments on the interconnected nature of the community to agricultural success, where “if farmers are grumpy, we’re grumpy.” Additionally, because of this lack of opportunity and declining investment in the community, many people are sending their kids to neighboring states or towns for schooling, including women who want to teach. Schools have been the core of communities for future generations and community events. The COVID-19 pandemic also notably changed community dynamics. People continue to try to recover after the pandemic. Fewer people investing in the

community, either with time or money, and fewer kids in school, greatly affect community engagement. Dynamics in intrahouseholds also affected community participation as well as women operating in these small rural agricultural communities.

4.3.1.6 Intrahouseholds

Similar to the oral histories, intrahouseholds were coded the least out of the key informant interviews (6.93%). Discussions of intrahousehold dynamics vary from the oral histories (Table 7 and 8). Emergent themes from the key informant interviews included balancing multiple responsibilities (i.e., household, economic, and agricultural resilience) and the need for team- and joint-resilience strategies (Table 8). The details of each are discussed in the following sections.

Balancing Household, Economic, and Agricultural Resilience

Women expressed feeling exasperated by the number of responsibilities they needed to balance to stay in agriculture. Most key informants are balancing jobs, agricultural duties, household responsibilities, and childcare. An agriculturalist from Cimarron County notes that you “still have a job at home,” when you get off work. Some have noted that they loosen their responsibilities in some areas, often agricultural duties, whether that means opting out of some responsibilities for that season, becoming “weekend ranchers,” or letting go of the operation entirely (Resident, Union County, NM). Sometimes the household responsibilities of cooking, cleaning, laundry, or other domestic responsibilities are left for women to pick up, even after they have long days of strenuous agricultural labor. Some women share that their husbands impose these gendered roles and disallow major involvement in agricultural labor. Most key informants, however, report that team efforts between spouses is a necessary household structure for resilient agricultural operations.

Team/Joint Resilience Strategies

Participants emphasize that joint operations between wives and their husbands need to be a team effort. This includes those with jobs in town running parts, buying feed on breaks, going home to water during breaks, and helping in the evening, or maintaining these jobs for extra income and health insurance. In some cases, women are handling the finances while men work in the field, with a few cases of the opposite. Jobs in town also tend to be accommodating, understanding that most women are handling several responsibilities at home, on the operation, and in their full-time jobs. Few participants employed hired help. In cases where hired help was used, women were divorced or widowed. Overall, women are very “strung out” when it comes to managing agricultural operations alongside their other responsibilities (Resident, Cimarron County, OK). Yet women have a love and passion for their operations that keep them going.

The passion many women expressed for their operations reflected resilient attitudes that prioritize their longevity. Women are reported to have a “different mindset” when it comes to agriculture (Resident, Union County, NM). A resident in Union County shares her experience with women in agriculture and finds that women approach agriculture with a balance of successful operations and sustainable practices that protect threatened environmental resources. This resilient attitude also applies to diversifying skillsets. One resident from Cimarron County also recognizes that the agricultural business can be unpredictable and encourages her children to pursue a college education to build a broader toolset. In general, women think about the future of their operations and livelihoods by aiming to better prepare the next generation of agriculturalists.

Conclusion

In sum, the increasing number of female agriculturalists documented in the USDA Agricultural Census reports shows increases in the formal recognition of women as female

producers and heads of household at the national scale. Furthermore, the Agricultural Census reports show women garnering importance in agricultural operations in formal spaces in the study area. However, the lived experiences of women in the oral histories and community perspectives from the key informant interviews in the study area show women have been (informally) involved in agriculture far before the 1978 report. The two qualitative stories illustrate the unrecognized and important labor women contribute to agriculture and SES resilience throughout history and currently. Women's history in agriculture begins in early settlements in the Southern Great Plains and continues to this day. Similarities exist between the oral histories and the key informant interviews. In particular, themes of generational operations, harsh climatic conditions, variable market pressures, and women's leadership and representation in institutional and community spaces continue. Struggling community dynamics persist throughout both qualitative datasets. However, even in a 10-year period, women in these agricultural communities have changed significantly.

The proportions of coded references between the oral histories and key informant interviews vary. In the oral histories, SES-FPE components of community (24.79%) and environment (21.94%) were coded the most (Table 7). In the key informant interviews, however, production (21.75%) and institutional (20.55%) themes are the most coded SES-FPE components (Table 8). Intrahouseholds, however, are coded the least in both the oral histories (9.53%) and key informant interviews (6.93%). These may indicate shifts in participant perspectives, expressions of gendered norms, and differences between the lived experiences of women over time.

Barriers and opportunities for women change between the two qualitative datasets. For instance, limited land, livestock, and economic opportunities has become a significant barrier for entry into agriculture since the oral histories. Largely, women's access to agriculture is through

their spouse, either current, ex, or late partners. Additionally, technology that was seen as a benefit in the oral histories is seen as a barrier in the key informant interviews for the increased cost it poses for agriculturalists. Many women in the key informant interviews also emphasized the difficulties in balancing all responsibilities, with many responsibilities imposed by historical gender norms and adoption of more management responsibilities. Overall, understanding rural agricultural communities' SES, complemented by FPE, highlights how historical cultural norms have influenced present-day agricultural structures, with barriers and opportunities for women shaping how resilience is achieved. In what follows, the three data streams are synthesized to answer the project's research questions.

This chapter explores the results of this mixed-methods research project by highlighting trends, similarities, and differences across the methods. The following section is a discussion of these results. Connections and implications are drawn between the streams of results to answer each research question of this project. Additionally, the broader implications of this research are discussed, along with the study's scope and limitations and future research opportunities.

CHAPTER V – DISCUSSION AND CONCLUSION

Introduction

The USDA Agricultural Census reports show that the increasing trend of female producers on a national level are also reflective of trends in Cimarron County, OK, and Union County, NM from 1978 to the present. The oral histories show women's involvement in agriculture predates the Agricultural Census reports by over 50 years. The key informant interviews complement the stories shared in the oral histories and provide more recent community perspectives on the shifted barriers and opportunities for women in rural agricultural communities in the 10-year time frame between qualitative datasets. Connections, linkages, and differences between methodologies are discussed in the following sections and explicitly address the project's research questions.

5.1 Women's Participation Over Time

Agricultural productions in the two counties vary but the trends of women are more similar than different. Cimarron County had a higher producer average than Union County despite having less land in comparison. Cimarron County also has a smaller population size than Union County. However, the similar averages of female producers, with 113.1 (23.22%) for Cimarron County and 112.9 (19.95%) for Union County, suggest that the increasing trend of female producers is similar for both counties.

Women, as primary producers and formal producers on operations, has grown in both counties since 1978. Notable changes in female producer counts are seen in 1997 to 2007 in the combined results of the counties, suggesting that cultural shifts and perceptions of the definition of a producer, as opposed to "helping out," expanded (Rocheleau 2015, 31). Small growth in primary female producers is seen from 1978 to 1997 with a large increase in female producers in

2002. However, some of this growth, particularly between 1997 to 2002, can likely be attributed to the responsibilities of the Agricultural Census reports transitioning from the United States Census Bureau to the National Agricultural Statistics Service. This shift included redefining what a producer entails, as well as the documentation methods used in the Agricultural Census reports to be more inclusive with multiple producers per farm being recorded. Thus, women from 1978 to 1997 who would have been considered producers under the 2002 definition may not have been recorded or were included in 2002 and later reports. Further, the increase in female producers from 1978 to 2022 can be misleading due to changes in documentation methods (Pilgeram et al. 2020). The substantial increase in producers, both female and male, after the transition to the NASS is seen in both counties. Reports from 2002 to the most recent can be considered more expansive than previous reports.

The growth of female producers is also reflected in increasing agricultural lands and land operated by women. From 1978 to the present, female producers have increased by 1094.23% and the increase in agricultural land operated by women is 1164.34%. However, the fluctuations in female producers are not necessarily reflective of the increases in agricultural land. For instance, where the number of female producers increase by 383.70% from 1997 to 2002, agricultural land operated by women only increased by 0.83%. However, women have increasingly gained access to land despite fluctuations between reports. Female producer counts indicate an increase in the number of women identified as producers with increasing access to land, suggesting greater formal recognition of women in agriculture.

Producer counts also seem to be affected by extreme cases of socioecological disruptions, such as drought. At the end of the 2010 to 2012 drought, female producers decreased by 29.17% in Cimarron County and by 15.17% in Union County. However, the droughts in the 2010s to 2015

seem to disproportionately affect women. The number of female producers decreased in 2012 at the apparent close of the drought, then declined sharply after a more severe drought in 2014 to 2015, seen in the 2017 Agricultural Census report. Agricultural lands, however, do not reflect the same effects. Instead, the land in farms operated by women increased significantly in 2017, with a 154.39% increase in Cimarron County and a 471.93% increase in Union County. These changes can indicate that resilience strategies to overcome drought were implemented or developed through management changes or disaster subsidies that expanded operations to achieve higher yields. Importantly, however, the USDA reports collect counts of identified female producers per each reporting year, as opposed to capturing all those participating in agricultural production. Therefore, especially from 1978 to 1997, informal agricultural labor may be historically undocumented. Thus, examining the reports alone can cause misleading conclusions.

The growing trend of women's involvement can be tied to the transition from invisible labor, i.e., a balance between household responsibilities and helping with the operation, to more visible labor as women continue to access and find more agency in operations. Additionally, the impact of historical cultural norms that imposed structured labor roles between women and men, with "desirable gender arrangements," may influence these transitions (Handy-Marchello 2011). While the Agricultural Census reports show increasing land operated by women and formally recognize women as producers, women throughout the period consistently have less land and make up a smaller share of the total producer population. Thus, this can suggest that women continue to have difficulties accessing agricultural lands. Women's involvement in agriculture dates to the beginning of settler histories, and labor continued and expanded as more as agriculture in the area became more successful. However, the results from qualitative sources contest these formal documentations of women in agriculture. In particular, the length of time and women's

participation in agriculture can be compared with their lived experiences to better understand what is happening on a smaller scale.

5.2 Women's Contributions to Agriculture and SES Resilience

Findings from the qualitative datasets show that women are involved in production in many ways. Women are also building blocks for resilient communities during socioecological disruptions, including drought and economic downturns. In the oral histories, the SES-FPE components community (24.79%) and environment (21.94%) were coded most often (Table 7). In the key informant interviews, however, production (21.75%) and institutions (20.55%) were coded more often than the other SES-FPE components (Table 8). Between both qualitative datasets, intrahouseholds were coded the least, with 9.53% in the oral histories and 6.93% in the key informant interviews (Table 7 and 8). The differences in coded references between sources can indicate the changing SES and conditions between when the oral histories and key informant interviews were collected, as well as the oral histories more expansive discussions, particularly temporally. To address research question two and its sub-questions, the qualitative results are used to examine how women have participated, the barriers to participation, women's entry points into agriculture and resilience, and their overall impacts on rural agricultural community livelihoods.

5.2.1 Women's Participation in Agriculture and SES Resilience

The representation of women in agriculture has grown in the Agricultural Census reports since 1978, but qualitative datasets show a much longer history. Production was the third-most-coded SES-FPE component in the oral histories, at 16.61% of total references, suggesting the importance of agricultural production for women (Table 7). In early narratives prior to the 1978 Agricultural Census report, women reported that their responsibilities in family operations took

many forms, including washing cream separators, managing small operations such as chickens or milk cows, herding cattle, feeding hired help or neighbors, and hosting large agricultural events. However, findings from oral histories show that women's labor has diversified and expanded over time, particularly during socioecological disruptions that necessitate a more flexible labor structure, often incorporating women into larger operational tasks. In later generations following initial settlements in the early 1900s, women are increasingly involved in management, financial decision-making, and operational leadership, especially when they transition to independent production after divorce or widowhood. Further, these transitions occurred over several decades, as reflected in the coded references to intrahousehold (9.53%) and economic (11.60%). However, these transitions do not negate women's participation prior. Instead, women's labor and contributions to production are unrecognized and otherwise invisible.

The involvement of women in agriculture continued and was reflected in the key informant interviews. Restrictions imposed by historical gender norms of women in a male-dominated field appear to be diminishing. Further, production (21.75%) was the most coded SES-FPE component in the key informant interviews (Table 8). This may suggest that production has become more important for women in the study area, or a larger share of daily activities for women are agriculturally related. Additionally, women's investment in the field, typically through generational legacies, motivates and ties many women to stay in agriculture. As seen in the oral histories and key informant interviews, their experiences growing up in an agricultural community and household prepared many women to take on larger management positions that historically have been held by men. The social barriers previously limiting women's participation in agriculture have blurred but continue to persist. The key informant interviews explicitly suggest

that equal involvement and participation in agriculture by men and women is seen as necessary, with a successful agricultural operation being a team effort.

5.2.2 Opportunities and Barriers for Women

Rural agricultural communities in Cimarron County, OK, and Union County, NM, are vulnerable to socioecological disruptions because producers' and communities' livelihoods are closely tied to environmental processes, large-scale economic systems, and governance structures. Historically, access to land has restricted many women from land ownership. Generational land legacies have tended to prioritize men, but in the past few decades, as the results illustrate, this has changed, with more women staying on generational farms or ranches. However, direct ownership of these lands tends to prioritize men, with some cases in the oral histories and key informant interviews showing shares of family lands being split among male and female family members. This trend, reported in both the oral histories and key informant interviews, continues to impact women's access to land. Many women find avenues to stay in agriculture by having to access land through their spouses, by renting, or by leasing. The historical consequences of gendered ownership of land can impact women more than men, where starting fresh, either with a spouse or on their own, lacks prior and generational investments in the operation. Therefore, women tend to be more adversely affected by socioecological disruptions, where either starting an operation on new land or after a spouse dies reduces women's adaptive capacities to overcome environmental disasters or economic downturns. In addition to limited land opportunities, institutional and financial resources can be restrictive for women.

Institutional and financial resources are discussed differently between the two qualitative sources. The oral histories elucidate the benefits of federal funds and financial opportunities, particularly in overcoming drought, and perceive them as vital for continuing their operations.

Although the competition of producers increases, where limited funds may prioritize operations with longer, more consistent histories, and independent female producers may be at a disadvantage because of male-dominated land legacies. Additionally, women in the oral histories note that diversifying funding sources is key, where some loans or programs do not provide enough to wholly overcome disruptions. The perceptions of institutional resources vary in the key informant interviews.

From the key informant interviews, participants observed changes in economic and government structures that narrowed funding criteria. Compared with oral histories, institutional resources (15.52%) and economic resources (11.60%) are coded less often than in the key informant interviews, at 20.55% and 17.12%, respectively (Table 7 and 8). This suggests that institutional and economic resources may be more important for these communities now than before, or that ways of accessing them formally and informally, through social norms, are also changing. Thus, although social and cultural values have enabled women's independence and autonomy in agriculture, structural barriers still exist. Loans and programs specifically available to women, like the socially disadvantaged category for federal Farm Ownership or Operating Loans, have changed with more restrictive eligibility requirements excluding women, or require strong social ties to financial institutions (Federal Register 2025).

Administration changes have adjusted funding pools for agricultural institutions, such as the Farm Service Agency and the Natural Resources Conservation Service, since 2025. From 2025 to 2026, budgets for loan pools and government employee salaries have decreased by ~23.16% overall (USDA 2025). Additionally, loans aimed at supporting historically socially disadvantaged groups, determined by race, ethnicity, or sex, have become more restrictive by not employing "the race- and sex-based 'socially disadvantaged' designation to provide increased benefits based on

race and sex in the programs” (Federal Register 2025, 30555). These resources have been helpful to female producers in the past, but with limited funding opportunities and rising prices of both land and livestock, women’s mobility in agricultural landscapes is greatly constrained. Thus, participants in the key informant interviews further emphasize the need for access to familial lands or support to consider being or staying in agriculture.

However, these opportunities for resilience in a restrictive landscape impose further complications for women to navigate convoluted institutional structures, usually with long-term relationships with these institutions or relying on families for support, where these opportunities can prioritize long-standing operations or large-scale industrial agriculture. Thus, women continuously find creative ways to continue in agriculture, often through self-reliant attitudes and labor.

To overcome these barriers, women leverage alternative resources through education, employment outside agriculture, and access to informal community networks and local economies. Due to the laborious nature of agriculture and the rising prices of land and livestock, having off-farm jobs has been reported as a necessity in recent years for the extra income and insurance these occupations provide. The oral histories mark this trend early, with many women engaging in informal economies by trading goods and taking on jobs in town for extra income. This engagement with local economies is evident in the key informant interviews, but with greater emphasis. Dual-income households with contributions from both spouses and family members are common and often a necessity for smaller operations.

Barriers to accessing agriculture in the oral histories were considered entry points in the key informant interviews. Specifically, technological advancements in farming equipment and machinery were seen as a barrier to agriculture due to increased costs, productivity gains that strain

environmental resources thus increasing prices, and rising market demands. In the key informant interviews, technology is viewed as an entry point for women by reducing the laborious costs of agriculture and increasing access to the agricultural business. Additionally, more women are involved in agricultural institutions, as evidenced by the key informant interviews, and women's involvement in overall agricultural systems is much higher than producer counts alone suggest. While there are increasing opportunities, women continue to experience structural barriers and residual gender norms in agricultural communities.

The gendered divisions of labor in operations and within the household persist. The oral histories show variations in women's roles and responsibilities within agricultural households. Some are more involved in agricultural operations, while others are primarily responsible for household labor. The same is reflected in the key informant interviews, yet with more cases of women feeling exacerbated and having to make sacrifices to make operations work. Further, intrahouseholds were coded more often in the oral histories (9.53% of total codes) than in the key informant interviews (6.93% of total codes) (Table 7 and 8). This may suggest that women's roles and responsibilities and/or gender norms in the study have diversified, on or off the operation, since the oral histories were conducted. While some women expressed varying levels of involvement on the farm, other types of labor within the home, community, or off-farm jobs that sustain the household should not be discredited. (Harcourt et al. 2018; Ferguson 2020). Instead, the varying ways women contribute to the household and operation are necessary labor roles for the overall success and resilience of the family operation.

Many women emphasize that a team effort is necessary, yet childcare, maintaining household environments, or caring for family members puts a significant strain on women. Thus, women either find resilient ways to manage all responsibilities or are forced into a conflict of

which responsibilities to prioritize (Rocheleau, Thomas-Slayter, and Wangari 2013). Both qualitative sources show how women take care of the household, but the stress associated with balancing multiple responsibilities, either in the home, on the operation, or their jobs, can be stressful, causing women to adapt through hiring labor, adapting present management techniques, or leaving agriculture entirely. Additionally, since decisions within the household and on the operation were less often made by women, transitioning to making decisions can be difficult, as the direct experience and comfort level in a risky occupation such as agriculture poses barriers specifically for women. Yet, women play a critical role in the resilience of rural agricultural SES beyond the operation itself.

5.2.3 Contributions to SES Resilience

Women have been the bedrock of communities in the study area by bridging intrahousehold, agricultural, and community spaces. Particularly during environmental hazards and economic downturns, women in the oral histories have maintained intrahousehold stability amid socioecological disruptions by adapting to climatic and economic conditions through household management changes, food provisioning, engagement with local economies, and shifts in labor divisions in agricultural households. Uniquely female techniques of household land use have been vital for survival, through canning, gardening, or having milk cows. These female traditions continue in the key informant interviews, further suggesting the importance of this labor for intrahousehold resilience. In both qualitative datasets, women have bolstered local economies that are fundamental for the survival of vulnerable rural agricultural communities during times of stress. Women tend to be strong contributors and facilitators of local economies, either through personal businesses, off-operation jobs in town, or direct investments in the upkeep of key civic institutions.

Key institutions such as schools, banks, post offices, or other civic institutions are the core of the rural agricultural communities in the study area. Not only do these institutions provide crucial civic services, but they also serve as places for building community. Many women in the qualitative sources are key leaders and actors within these civic institutions that preserve community livelihoods and foster interest among younger populations in maintaining agricultural communities. Their contributions are often invisible in national accounts, as they foster close cooperation among community members that is fundamental to rural agricultural SES. Amongst FPE-SES components, women simultaneously contribute to environmental, economic, production, and intrahousehold resilience, as their labor and navigation within SES extend across multiple components.

Additionally, women have increasingly assumed institutional roles and responsibilities and continue to serve as community leaders in both formal and informal spaces. Community was the most coded SES-FPE component, comprising nearly a quarter of total references, and the third most important in the key informant interviews, accounting for 18.82% of total codes. Across both qualitative sources and over time, “community” remains important to participants in fostering SES resilience. However, women’s labor in these spaces may be undermined, not by their local communities, but rather by large-scale influences like state and federal entities that give limited support to rural civic institutions that many of these women’s groups represent (Adams, Juran, and Ajibade 2018; Leder 2022). Thus, many women share that they rely heavily on others within their community in a self-sufficient manner.

At the community level, women organize groups and clubs that primarily invest in their communities, either financially, educationally, or culturally. Extension and women’s groups continue to persist, as evidenced by oral histories and key informant interviews, despite downturns

and hardship. Especially given the hardships experienced during the decade between the oral histories and the key informant interviews (2015-2025), women share how they have fostered community cohesion and resilience by maintaining community events and encouraging participation. The informal community groups have been vital for community cohesion and garnering interest from state actors or community members to continue investing in the community. In both formal and informal spaces, women leaders contribute to the overall resilience of the community and their household (Campbell 2013).

Notably, women play central roles in social reproduction, the ongoing work, often unpaid or undervalued, necessary to sustain personal and community livelihoods (Bohle and Vukov 2025). Women's central roles include maintaining household spaces, "helping out" or co-supporting in agricultural operations, and holding educational positions in schools, Extension, and clubs or groups (Rocheleau 2015, 31; Ferguson 2020; Bohle and Vukov 2025). As the results illustrate, however, community participation overall has decreased due to environmental, economic, and institutional factors, which may be the reason for a lower percentage of total codes attributed to the community in the key informant interviews. Agriculture and community livelihoods are inextricably intertwined. The narratives shared by women show their involvement in sustaining both agricultural and community through investments in community identity/cohesion, local economies, key civic institutions, and the maintenance of household spaces. Overall, contributions from women to their local communities have significant impacts across multiple scales, thereby making women key actors in SES resilience, even when their work can be underrecognized by outsiders in formal agricultural and institutional settings.

The scale and temporal ranges of the results provide differing but complementary insights into the role of women in rural agricultural communities and SES resilience. The USDA

Agricultural Census reports show increasing formal representation of women in agriculture and in land ownership since 1978, but the oral histories show a much longer history of informal involvement. Women's contributions prior to 1978 were integral to the overall functioning of agricultural production, as evidenced by the oral histories. Additionally, as emphasized in both the oral histories and key informant interviews, women have been the bedrock of communities from the early days of settler history to the present. Women's roles in SES resilience are diverse, ranging from supporting intrahousehold income and management to investing in and maintaining community institutions and groups. Yet, women continue to experience the effects of historical gender norms, which limit their access to institutions, financial and environmental resources, and hands-on generational agricultural knowledge. While the formal representation of women in agriculture is increasing, much of women's labor that underpins the agricultural community's resilience remains unrecognized.

5.3 Broader Implications for Policy and SES Resilience

The findings from this project highlight clear differences among national-scale perspectives, the lived experiences of women, and broader community perspectives on women's involvement in agriculture. These differences can have significant implications for women in the study area. Policies and programs that rely on these national-scale narratives and prioritize industrial operations over family-oriented operations risk excluding the hard labor women have performed and overlooking the structural barriers that persist for women in this field. Expanding access to land, livestock, and funding can greatly benefit women in agricultural communities in the Southern Great Plains. Rising agricultural prices pose a continuous hurdle for women, and institutional resources can ease this burden. Participants in the key informant interviews note that most information is shared by word of mouth rather than through online materials and formats.

With continuous changes in policy and funding for institutions, clear documentation of these changes, shared through the most effective mode of contact for women in the two counties, can be beneficial. Thus, finding ways to operationalize communication methods of the available funding pools and their limitations can increase overall SES resilience of these communities.

Outside of agriculture, investments in rural institutions, such as schools and Extension Services, and in businesses are essential for both community livelihoods and for incentivizing future generations to pursue agriculture. Incorporating key community spaces and institutions into resilience strategies is critical to the future of agriculture and its communities. This includes supporting both formal and informal groups. Women's involvement and leadership in civic and community-led efforts have and continue to play a role in overall SES resilience. Therefore, policymakers' investments in women's leadership and community building can improve agricultural systems. Policy reform that explicitly recognizes the barriers women continue to face in systemic contexts is necessary, either by reissuing loan opportunities for women or by broadening how labor is documented per farm to include other forms of labor, big or small.

5.4 Conclusion

This master's thesis project contributes to systems-thinking approaches to studying rural agricultural SES by incorporating gender as a critical variable shaping mobility and interactions within social and environmental systems. The Southern Great Plains region continues to experience the effects of global climatic changes, influencing cyclical drought patterns and economic markets. Historical gender norms permeate present-day SES structures, continuing to shape the relationships among environmental, economic, production, institutional, community, and intrahousehold resources and systems. Thus, the Southern Great Plains is a region with numerous opportunities to explore these relationships and trade-offs.

Chapter one of this study introduced the research problem, the study area, and its relevance to present-day research and initiatives for SES resilience. Context for the research problem and study area included agriculture in the United States, female producers on a national scale, the Great Plains and agriculture, the Southern Great Plains and agriculture, specific background information on the two counties, and women in agriculture in the Great Plains broadly. Chapter two explored and synthesized the two important realms of thought, SES and FPE, chosen for studying resilience in the two counties for the SES-FPE framework that shaped this research. Chapter three presented the mixed-methods approach for this study, which streamlines multiscalar and multitemporal contexts by using USDA Agricultural Census reports, oral histories, and key informant interviews. Chapter four presents the results of this project with a discussion of the analysis of the results in Chapter five.

Each methodology addresses its respective research questions and is triangulated with the other data streams for integrative analysis. The USDA Agricultural Census reports reflect national trends in both counties, with the number of female producers increasing from 52 in 1978 to 621 in 2022 (Table 4). While some differences exist between counties, the growth of female producers from 1978 to the latest report indicates a transition for women in agriculture, with indicators suggesting the influence of drought (Table 5). Land operated by female producers also increases gradually alongside the overall trend of more women producers being recorded in the reports. Additionally, the USDA Agricultural Census reports document the formal increase in the representation or acknowledgment of women in agriculture from a national perspective, even though the oral histories show women's involvement extends much further back in time than the reports suggest.

Across interviews, participants share their unique experiences with environmental and agricultural challenges, economic and institutional changes, intrahousehold adaptations, and community struggles from the early 20th century to the present century. Taken together across community members, these themes reflect individual experiences of living and navigating challenges as women in a rural agricultural SES. Women's involvement in agricultural operations often began with, or shortly after, the establishment of settlements in the study area in the early 1900s. Women share their experiences helping with agricultural production from a young age, emphasizing the importance of this labor during droughts and economic downturns. Early beginnings in agriculture are common, where similar stories are found in the key informant interviews. However, structural barriers are found in institutional funding, extreme market fluctuations, and continued social barriers founded on gender norms. While women's involvement in agriculture may be less contested among community members, women continue to face barriers to participation due to historical gender norms that have structured agricultural communities' SES.

Understanding the intimate sociocultural context in which gender operates is crucial to studying SES resilience in the Southern Great Plains and beyond. While this project focuses on women, the same approach can be applied to other genders and social differences, including race, ethnicity, and class. When studying SES resilience, this project shows that gender is a critical variable shaping individuals' adaptive capacities and resilience strategies. Social systems are complex. Understanding the effects of gender, informed by individual and community experiences, can be applied across multiscale environments in policy, governance, and initiatives to support women and rural agricultural communities.

Furthermore, this project expands upon and further operationalizes an SES and FPE framework designed for a different study (Hinsdale et al. 2026). In particular, the convergence of

SES and FPE provides a critical lens for understanding on-the-ground perspectives and incorporating these experiences into initiatives to foster resilience in rural agricultural communities. Using a SES-FPE framework in this research project helped reveal the numerous ways women are involved and contribute to rural agricultural communities SES, as well as the gender-specific barriers for women in the study area. The differences across data streams show that barriers and opportunities for women change rapidly.

Women's increasing formal representation is one structural barrier whereas the lived experiences of women in the study area express their responsibility in the overall operation. Agriculture is a rapidly changing business, with new technologies, unpredictable environmental conditions, and shifts in institutional funding. The combination of the continuous evolution of agricultural production and systemic barriers can disproportionately affect women by reducing their adaptive capacity to respond. Gender has and continues to affect SES. Resilience is embedded in the livelihoods of many in this community through shared experiences overcoming SES disruptions, with women as the core to fostering SES resilience.

Further, the mixed methods used in this project provide opportunities for future SES resilience research that incorporates the diverse lived experiences and perspectives of community members. Utilizing the Agricultural Census reports, for instance, provides insight into how national and state policies shape the study area and show the formal representation of producers and their operated lands. The oral histories contain information and experiences that are often not recorded in formal data or information, like the Agricultural Census reports. In particular, the oral histories capture intimate experiences when adapting to SES disruptions and how they overcame these changes. The techniques, skills, or institutional avenues adopted can be identified from the oral histories, providing opportunities to enhance access to resources and to build on these

adaptations. Additionally, the oral histories and key informant interviews showcase individual and community experiences in SES resilience, further identifying the unique sociocultural context and the informal structures guiding people's adaptive capacities and barriers. When stratified by gender, examinations of SES become more robust, allowing for an understanding of the structural barriers that can enable or prohibit adaptations to socioecological disruptions. Women's involvement in agriculture is not new; it is simply being recognized, yet there remain shortcomings in this recognition.

5.5 Scope and Limitations

This project investigated the gendered dimensions of SES resilience in rural agricultural communities in the Southern Great Plains. This study employs a mixed methods approach that compares qualitative and quantitative datasets, where direct comparisons between datasets can be difficult because of how they are collected and analyzed. The Agricultural Census reports do not fully capture women's roles and responsibilities in agriculture. The shifting definitions of "producer" in these Agricultural Census reports impact how the data is analyzed. In particular, the transition of the reports from the United Census Bureau to the National Agricultural Statistics Service between 1997 to 2002 led to changes in documentation. Each report compares the current year's statistics with those of the last published report. In 2002, recalculations of the 1997 report were published that differed from the original, but these were not used in the analysis to preserve the data-collection methods of producer counts per report.

The qualitative datasets are similar and dissimilar in many ways. The conversations remain connected across themes but given the means of data collection for the key informant interviews, as well as the length and quantity, especially descriptive notes (versus transcripts), can make direct comparisons between qualitative datasets challenging. Thus, statistics of the qualitative coding

should be interpreted with care. Additionally, given the historic nature of part of this study (female Dust Bowl Survivors), this study treats gender as a binary where women and men are viewed in relation to one another. While this can pose limitations and negate the complexities of gender in its many forms, this binary is reflective of norms in rural agricultural communities. Additionally, this project focuses on women's experiences in rural agricultural communities and SES resilience, where the (re)production of gender norms is not within the scope of this project.

However, taken together, the triangulation of results illustrates the multifaceted ways women foster SES resilience and are perceived in the study area. While reporting women producers in the USDA Agricultural Census reports was not standardized until 1978, the rapid changes in the formal recognition of women in agriculture show a changing institutional barrier adapting to women's involvement. This change on an institutional level is particularly important for funding and programs specifically for women. The oral histories show the long histories of women in agriculture and their roles in fostering resilience, while the key informant interviews provide a more recent community perspective, enabling comparable insights to be drawn, given several structural changes occurring between data collection. To end, while the formal representation of women in agriculture does not reflect on-the-ground perspectives, participants note it as important for further opportunities for resilient rural agricultural communities. Triangulating data in this research project was key for putting each method in conversation for more informed analyses.

5.6 Future Research Opportunities

The findings from this master's thesis research project are but one piece of the broader picture. This research builds upon years of research in the study area under Dr. Jacqueline Vadjunec's purview. This study aimed to build on the groundwork laid by Dr. Vadjunec and

address a point of interest identified before this project began. The results of this project, therefore, move forward the larger USDA-funded project on slow-onset disaster and its subsequent work. The results of this project will be included in future publications in academic journals and will continue the conversations of gender in SES resilience. Results will also be shared with participants who expressed interest in the project, as well as with local institutions and agencies, through a brochure outlining the major findings.

Future directions for this research can include expanding to more counties in the Southern Great Plains, as well as the other regions within the Great Plains. Investigating gender dynamics in rural agricultural communities across the Great Plains could enable regional comparisons where sociocultural contexts, governance structures, and environmental conditions vary. Additionally, the Great Plains extend into both Canada and Mexico, where institutional structures vary from those in the United States. Thus, regional differences can be identified not only in the United States but also internationally.

An additional future direction is to apply the SES-FPE frameworks in other contexts where historical gender norms manifest differently. While this place-based study focuses on women in the Southern Great Plains, the SES-FPE framework and approach can be applied to examine other areas of geographic inquiry. Comparisons using an FPE-SES framework can illuminate the context-specific social and environmental systems capacity to adapt to changes and hardship. Furthermore, employing the SES-FPE framework in transdisciplinary work aiming to understand human-environmental relations and the actors within them, bridging geography, agricultural studies, and women's studies can further explore the implications of women's role in SES resilience and how to contribute to these efforts. Additionally, the nuances of FPE are broad, where further investigating the ethics and role of care work in rural agricultural communities can be a

future direction (Bauhardt 2019). Further research examining the effects of socially determined categories on SES resilience can yield more robust understandings of how social differences operate within SES, while also improving efforts to sustain rural agricultural communities.

Appendix I

Participatory Approaches To Agroecosystem Resilience In Times Of Drought (ARID): An Example From The Southern Great Plains

Question guide for focus group and key-informant interviews

Main Investigators: Jacqueline Vadjunec (Geography, OSU/OU Co-PD) Caiti Steele (New Mexico State University, PD)

Questions to explore Identity, Perception, and Community:

How long have you lived in this county/area?

Where did your family come from? How did they get to this place? *(Explore migration history)*

How would you describe this community? What does it mean to you to live in this community?

What is the most important aspect of living in this community? Why?

What makes this place special?

Tell me about the people who live here?

What types of social activities, events, and/or memberships are important in your community? *(Explore past and present)* Who is often responsible for these community events or activities?

How have the people and surrounding community changed in the last 10 years?

In your opinion, what are the biggest challenges and benefits to living here?

What does it mean to be from your state?

Do you feel connected to your state? Why or why not?

Questions to explore Land Use/Land Management:

How do most people in your county make a living?

Have any legal issues *[also probe for others: political, economic, environmental, cultural]* occurred over land use where you reside?

If yes, how have these issues (defined above) affected land use? How have they affected people in your community's ability to make a living?

What types of agricultural policies have the most impact on your agricultural practices (+/-)? *(Explore various policies such as disaster, crop, EQUIP, CRP, etc.)*

Have you made changes to your agricultural practices? If so, what changes you made? Why? What were the results of these changes (+/-)?

Where or how did you learn these new practices? (prompt regarding access to information across producer types, genders, etc.)

Do you think the government should have any role in managing the lands where you live? If so, how?

Do you think fire should play a role in managing grasslands? How do you think cattle should be managed on grasslands?

What do you think the future of agriculture looks like in this region?

Do you use any precision agriculture equipment on your land?

Do you use high technology (*computers, Internet, smartphone, etc.*) in your day-to day life? How often? Do you have an internet connection at home?

Do you use the internet regularly? If so, why do you use the internet? What resources/websites do you visit often?

Do you have a smartphone or tablet? If so, what kind of application do you use?

Why? Do you use any weather, farming or ranching related smart applications to run your operations?

Do you think technology (*satellite imagery, web-based mapping such as google earth*) can play a role in better managing grasslands? If so, how?

Questions to explore Land Tenure Policies:

Are there public lands in this area? If so, what are they used for?

Can you describe the general opinions of residents regarding leasing from the state?

What are the advantages / disadvantages of leasing public lands? How important is leasing land to local residents' livelihoods?

Can you describe the general opinions of residents regarding leasing or grazing CRP lands?

How do differences across state lines impact land use/land tenure? [*Probe for range of impacts, +/-*]

In your opinion is there government support for producers, including new and/or non-traditional producers? [*Probe for range of support, impact, +/-, other recommendations*].

How can public land policy be improved upon?

Questions to explore Water Issues and Irrigation:

What are major water concerns or issues in the area?

Are there any water restrictions or regulations in your community?

Do you think that these policies are fair? (+/-)

How/should there be more and/or different policies?

In your opinion, is irrigation necessary to sustain agriculture in the region? Why?

In your opinion, is irrigation and water for irrigation an issue you are concerned with? Why?

Do you think that your community is too reliant on irrigation for agriculture? In your opinion, does irrigation make the community more or less vulnerable to long-term drought? *(Probe why or why not, how, etc.)*

What do you think is the future direction for irrigation for agriculture in the area? *(Explore)*.

Do you think well/water monitoring is important? Explain. What are the opportunities and challenges to developing participatory community water monitoring programs in your community?

Questions to explore Drought and Climate Change:

How / has your community been impacted by drought?

How / has your community as a whole adapted to changes in weather and/or precipitation?

Have people here faced any economic challenges faced because of drought?

Can you provide any examples how people here have adapted to drought and related land use in your community? If so, what? *[Probe for a full range of adaptations: working in the city, agritourism, land management practices.]*

How impacted by drought was your area in comparison to other areas?

In what ways have different individuals and local communities been successful/unsuccessful in adapting to drought? (including new and/or non-traditional farmers) in times of environmental distress?

How did you learn these successful skills?

Has there been support from your community which has been helpful for farmers? What support would be helpful? *[Probe different needs for farmers at different stages, etc.]*

Has agricultural technology played a role in better adapting to drought? If so, how? *Explore individual and community levels-- examples: satellite imagery for soil management (geomapping), GPS enabled farm equipment, solar panels/water pumps, smartphone land management, mobile computing, electric motor drives in farm equipment, center pivot irrigation, etc.*

Do you think these technologies have made you more or less vulnerable to drought? (Explore).

Do you use any kind of technology devices in your line of work to mitigate and prepare for hazardous weather? (*Explain.*)

Has anything been done to help farmers/ranchers during times of extreme weather events? [Probe for historical unfolding up to current day and by whom].

How do farmers or ranchers in your community use weather and climate/precipitation data to make agricultural decisions?

What do you think should be done to help residents in times of extreme weather events? How would you compare the current drought to the Dust Bowl?

Do you think that climate change has been the source of this drought? Why or why not?

Questions to explore Communication Networks:

What leaders, individuals, or organizations in your community assist others in times of drought?

In what ways are accountants, farm agents, and financial institutions (*explore range of public and private actors*) involved in helping farmers deal with drought?

What do you think farmers and ranchers can do to prepare for and mitigate drought impacts?

What lessons about managing in drought have you learned from other farmers?

Have you or others you know used information from local extension agents or online extension factsheets before? Can you share an example of how/when?

How do you think the community would change if more support was given to new and/or non-traditional producers?

Do you and your family use online communication (*e.g. Facebook, email*) regularly? [Explore].

Are community events advertised online? If so, where?

How can new technologies help people in this community better communicate?

How can science be done in ways to make the results more effective for people in your community?

Questions to explore Gender and Resilience

Where/from whom/how did you learn about agriculture? (*Explore history, gendered differences, etc.*).

Do you think women are more involved in agriculture now than there have been in the past? Explain.

In your opinion, how/is labor gendered in agricultural communities and households? *[Explore differences in male vs. female labor, traditional and non-traditional roles in ranching and farming across scales]*

What resources are available to support agricultural operations, including during times of drought? *[Probe: resources accessed, ease of access, communication or resource, any perceived gender differences, recommendations, etc.]*

In your experience, are farm service agents easy to access? How have they helped you in your agricultural operation? How might they be more helpful? (+/-)

What do you see as the opportunities and also barriers for female agriculturalists in this area? *[Explore how women navigate agriculture in the region, +/-, especially through drought and other environmental disasters and extreme events]*

What resources exist/should exist to help female agriculturalists in the area? Explain. *[Probe formal agency assistance vs informal community assistance etc.]*

What other roles or responsibilities make keeping up with farming or ranching difficult?

As far as resources for new farmers, what would be helpful and why? *[Probe for community and policy support.]*

Do you think these resources would be helpful for other communities outside your own?

**This is an open-ended Interview Guide subject to modifications consistent with a qualitative inquiry. As interviews present new threads to follow, they will be added to the interview guide as relevant. For example, we expect to surface several types of tourism and would expect to then ask questions about those types, subjects represent main themes to be discussed.*

Appendix II



This is to certify that:

Lanah Hinsdale

Has completed the following CITI Program course:

Human Research
(Curriculum Group)

Community-Engaged Research (CEnR)
(Course Learner Group)

1 - Basic Course
(Stage)

Under requirements set by:

University of Oklahoma



Completion Date 16-Jan-2024
Expiration Date 16-Jan-2027
Record ID 60551085

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This is to certify that:

Lanah Hinsdale

Has completed the following CITI Program course:

Human Research
(Curriculum Group)
Social Behavioral Modules
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

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Expiration Date 18-Jan-2027
Record ID 60551084

This is to certify that:

Lanah Hinsdale

Has completed the following CITI Program course:

Information Privacy Security (IPS)
(Curriculum Group)

Information Privacy Security (IPS)
(Course Learner Group)

1 - Basic Course
(Stage)

Under requirements set by:

University of Oklahoma

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Completion Date 18-Jan-2024
Expiration Date 18-Jan-2027
Record ID 60551083

This is to certify that:

Lanah Hinsdale

Has completed the following CITI Program course:

Responsible Conduct of Research

(Curriculum Group)

RCR: Responsible Conduct of Research

(Course Learner Group)

1 - RCR

(Stage)

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Completion Date 19-Jan-2024
Expiration Date 19-Jan-2027
Record ID 60551086

This is to certify that:

Lanah Hinsdale

Has completed the following CITI Program course:

Revised Common Rule
(Curriculum Group)

Revised Common Rule
(Course Learner Group)

1 - Basic Course
(Stage)

Under requirements set by:

University of Oklahoma

Not valid for renewal of
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Appendix III



Institutional Review Board for the Protection of Human Subjects
Notice of Deferral Approval for OU Collaborator to Conduct Research

Date: June 17, 2025

Principal Investigator: Jacqueline Vadjunec, Lanah Hinsdale

IRB#: 18726

Reference#: 777592

Study Title: Participatory Approaches to Agroecosystem Resilience in Time of Drought (ARID): An Example from the Southern Great Plains

This letter is to notify you that the University of Oklahoma (OU) Institutional Review Board (IRB) has approved your request for OU to defer all IRB responsibilities with regard to the above-referenced study to the IRB at Oklahoma State University. This signed and IRB- approved OU Collaborator Assurance serves as the University of Oklahoma IRB's approval for you to conduct your research under the review and authorization of Oklahoma State University.

On behalf of the OU IRB, I have reviewed the above-referenced study and determined that it meets the criteria for deferral. As a collaborating investigator on this study, you are responsible to:

- Conduct the study in a manner consistent with the requirements of the IRB's of Oklahoma State University and the University of Oklahoma and federal regulations 45 CFR 46;
- Request approval from the Oklahoma State University IRB prior to implementing any/all modifications;
- Notify the Oklahoma State University IRB of any protocol deviations or unanticipated problems;
- Maintain accurate and complete study records for evaluation by the Oklahoma State University and University of Oklahoma HRPP Quality Improvement Program and, if applicable, inspection by regulatory agencies and/or the study sponsor; and
- Notify the Oklahoma State University IRB at the completion of the project.

For circumstances involving the review of uses and disclosures of protected health information (PHI) under the Health Insurance Portability and Accountability Act (HIPAA), a determination will be made between the two institutions as to who will serve as the Privacy Board, if applicable.

If you have questions about this notification or using iRIS, contact the HRPP Office at 405-325-8110 or irb.ou.edu.

Cordially,

Lara Mayeux, Ph.D.
Chair, Institutional Review Board

Appendix IV

Participant Information Sheet for Key Informant and Focus Group Interviews

Participatory Approaches to Agroecosystem Resilience in Times of Drought (ARID): An Example From The Southern Great Plains

Main Investigators: Jacqueline Vadjunec (Oklahoma State University, University of Oklahoma, Co-PD) Caiti Steel (New Mexico State University, PD)

Purpose: The purpose of this project is to conduct interviews with residents and researchers/staff living and working in the grasslands of the High Plains Aquifer region of Oklahoma, New Mexico, Colorado, Kansas, and Texas in order to better understand how policies impact land-use and water management among male and female agriculturalists in Grassland regions, and how these decisions impact local livelihoods, especially during times of drought. This research also explores how participatory approaches to resource management can lead to better natural resource management.

Procedures: The interview (key informant or focus group interview) should take approximately 30 – 60 mins to complete and will follow a question guide that will be offered to you prior to the interview (or focus group). Notes will be taken by the interviewer during the interview (or focus group). Finally, additional related questions may be asked in the course of the interview. At no time during the interview will your identity be recorded. Furthermore, your interview will not be recorded.

Risks of Participation: There are no known risks associated with this project, which are greater than those ordinarily encountered in daily life.

Benefits: Results will benefit land users by providing important information regarding effective land and water policies to aid in sustainable land and water management decisions.

Confidentiality: Your identity will remain completely confidential during the interview process. Furthermore, any notes from the interview will be written completely anonymously (your identity will not be recorded). Pseudonyms will be used at all times in the published presentation of any material gathered from the interview. The information you provide will be kept securely in hard copy and password protected digital form in the office of the Main Investigators at Oklahoma State University/University of Oklahoma and New Mexico State University.



Approved: 07/09/2025
Protocol #: AS-18-24

Contacts: If you have questions about the research project or procedures, you can ask me now, throughout the interview (or focus groups), or contact Jacqueline Vadjunec, Researcher in charge of Human Subjects protection for the research component, 405- 334-6788, jacqueline.vadjunec@okstate.edu. For questions regarding the broader project or extension activities, you can contact Caiti Steele, Project Director, caiti@nmsu.edu

Participants Rights: Your participation is voluntary and you can withdraw from the interview (key informant or focus group) without prejudice. In the event that you withdraw from the interview, any information gathered from you will be either given to you or destroyed. You may provide restrictions as to the use of portions of the interview (or focus group), which will be edited out of the final notes. If you have questions about your rights as a research volunteer, you may contact the Oklahoma State University Institutional Review Board (IRB) Office at 223 Scott Hall, Stillwater, OK 74078, 405- 744-3377 or irb@okstate.edu.



Approved: 07/09/2025
Protocol #: AS-18-24

Glossary

Adaptation — Traits, processes, and skills used to overcome a change or burden in social structures and environmental conditions (see also Adger et al. 2005; Walker et al. 2006; Berkes 2017).

Adaptive Capacity — The ability of people, social systems, or ecological systems to overcome barriers or changes by accessing opportunities, resources, or alternative avenues to change (see Cohen et al. 2016).

Anthropocene — An era of intense human activity contributing to environmental degradation on Earth's climate, ecosystems, and geological processes as well as the uneven social, economic, and political forces driving these changes (see Mann and Kump 2015).

Drought — An extended period of time marked by lack of precipitation, depleting and deficient surface/ground water resources, and deficient soil moisture impacting socioeconomic stability and livelihoods (see NWS 2006; Disasa et al. 2026; NIDIS n.d.).

Feminist Political Ecology — An approach to investigating human-environmental systems that focuses on how social differences (e.g., gender, race, ethnicity, caste, etc.) shape access, control, and relationships with human-environmental systems (see Rocheleau, Thomas-Slayter, and Wangari 2013).

Intrahousehold — The dynamics and internal social structure guiding and shaping roles, power, and decision-making authority in the household production system (see Radel 2012).

Producer — A person who is actively engaged in agricultural production, as an owner, tenant, hired manager, or employee. This includes decision-making and management responsibilities, as well as agricultural tasks on the farm and financial decisions (see USDA NASS 2022d, 2022c).

Resilience — The capacity of socioecological systems to overcome and absorb changes, through adaptations that fundamentally restructure the overall systems without losing its core system structure and processes (see Walker et al. 2006; Robinson and Carson 2016).

Socio-Ecological Systems — Integrated and interconnected social and ecological systems, comprised of subsystems or components that interact with each other. Interactions include feedback loops between systems that shape resources and resource use (see Berkes and Folke 1998; Ostrom 2009; Berkes 2017).

Social Reproduction — The labor and responsibilities involved in sustaining households, communities, and livelihoods across community members and generations, often undervalued, unpaid, and gendered (see Ferguson 2020; Bohle and Vukov 2025).

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